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PANEL DISCUSSION ON RHEUMATIC DISEASES IN THE AGED*

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Panelists: ‡CHARLES V. HECK, M.D.; EDWARD F. ROSENBERG, M.D.; DAVID RUML, M.D., AND L. EMMERSON WARD, M.D.

MODERATOR DWIGHT C. ENSIGN: We shall first discuss osteoarthritis, that is, degenerative joint disease, or chronic hypertrophic arthritis. This condition, universal in a geriatric population, is suggested by radiologic reports of hypertrophic spurs, though it must be realized that extensive spurs may be present in various areas without causing symptoms.

Something can be done for osteoarthritis. We are going to tell what has proved useful in our experience in various arthritic conditions, with the hope of offering something helpful. If the physician takes an interest in the person with this disease, no matter what type the arthritis, and devotes time to working out the correct diagnosis and appropriate treatment, he will be rewarded with a grateful patient.

Dr. Ward, what is osteoarthritis?

DR. L. EMMERSON WARD: First, it should be understood that osteoarthritis is a degenerative condition of the joints. The degeneration arises primarily in the hyaline cartilage. The involved cartilage develops an irregular, granular surface and becomes furrowed, pitted, split, frayed and eroded. The degeneration in the cartilage is followed by cartilaginous and bony hypertrophic changes at the margin of the joint, the so-called marginal lipping or spur formation. Eburnation and sometimes cystic changes develop in subchondral bone.

Osteoarthritis is generally divided into two types: primary osteoarthritis, in which the degeneration appears to be a part of the usual aging process; and secondary osteoarthritis, in which the degenerative changes have been speeded or aggravated by some other factor. This factor may be: 1) major trauma, such as fractures into joints, sprains, dislocations, contusions or gunshot wounds; 2) microtrauma, such as that which results from repeated minor abuse, overuse or strain of a joint over a long period, *e.g.*, in obesity, in certain occupations, and

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in the presence of misaligned joints or loose bodies; 3) hemarthrosis, as in injury or hemophilia; 4) inflammatory articular disease, such as rheumatoid arthritis and specific infectious arthritides; 5) chronic gouty arthritis; 6) ochronosis, and aseptic necrosis of bone; 7) sensory disorders such as tabes dorsalis, syringomyelia, or diabetic neuropathy; 8) caisson disease; or 9) acromegaly.

There may be factors other than the ordinary aging processes in some cases of so-called primary osteoarthritis, but if so, these are not well defined at present. Some patients seem to have a familial tendency toward premature osteoarthritis; in many of these families there is also a history of early graying of the hair.

MODERATOR ENSIGN: Don't you think that normal degenerative changes are an important part of this picture?

DR. WARD: Certainly, such changes develop in everybody.

MODERATOR ENSIGN: One of the common manifestations is Heberden's nodes.

Dr. Rosenberg, do Heberden's nodes necessarily indicate generalized osteoarthritis? What would you say, in general, about the diagnosis of osteoarthritis?

DR. EDWARD F. ROSENBERG: Heberden's nodes may be considered a local effect of osteoarthritis, but these nodes frequently are seen in patients in whom there is no evidence of disease elsewhere. This raises the question as to how to recognize osteoarthritis. What findings allow a physician to make the diagnosis of osteoarthritis? Most practitioners are familiar with this subject, but I shall review it briefly.

Dr. Ward pointed out that writers have often described two types of osteoarthritis, a primary and a secondary type. Primary osteoarthritis is a progressive disease affecting joints in a distinctive pattern and within a certain age period. Secondary osteoarthritis resembles primary osteoarthritis from a structural standpoint, but affects only individual joints, or joints in locations that have been subjected to special types of injury.

The primary type is associated with advancing years and is found in both men and women. Heberden's nodes are found more frequently in women, may appear as early as the third decade, and occur with increasing frequency in the third, fourth, and later decades.

The middle group of interphalangeal joints may be affected in some instances. However, this disease usually does not affect either the proximal interphalangeal joints or the wrist, and practically never involves elbows or shoulders. Small joints of the toes, except for those in the big toes, escape. Characteristically, hip joints, knee joints, and lower cervical, middle dorsal, and lower lumbar vertebrae are involved. The evolution is slow. Explosive episodes are rarely observed in osteoarthritis.

Pain usually is exaggerated by weight-bearing. A sensation of stiffness often appears after inactivity. A patient with osteoarthritis generally has an appearance of well-being. The blood sedimentation rate is usually normal; occasionally it is slightly elevated. Hemoglobin values, red blood cell counts, and leukocyte counts are generally normal, as are values for the usual blood chemical tests. Roentgenographic changes may be distinctive in the early stages of the disease. Cartilage is involved; hence, joints may appear narrowed. Later, spurs and other changes may be seen in the margins of the joints.

MODERATOR ENSIGN: Dr. Ruml, will you tell us about currently accepted therapy in the generalized form of osteoarthritis? What is the treatment? Specifically, do steroids have any place in the treatment of osteoarthritis?

DR. DAVID RUML: The first thing to do is to reassure oneself as to the form of the disease with which one is dealing. Most patients with degenerative arthritis are not severely disabled. The outlook is fairly good. When Heberden's nodes develop, the patient is relieved to know that he does not necessarily have rheumatoid arthritis, which he fears because of the large, painful nodes.

A common-sense attitude should be adopted toward physical activity. The patient must understand that he should have a reasonable amount of activity, but a man 70 years of age who has extensive changes should not be playing 36 holes of golf. Many patients are overweight; therefore a weight reduction program is extremely important. Unfortunately, one cannot promise the patient that he will feel better if he loses weight, but he may well be worse if he doesn't lose it. Posture plays an important role, whether the patient is standing, sitting, or lying down. I usually recommend a firm chair with a straight back, and frequently a bed-board to stiffen the mattress. Other measures include the use of heat, either moist or dry, and warm baths. The salicylates are the safest and most widely used medication. Some patients, particularly those with degenerative arthritis of the knees, can be helped by the use of intra-articular hydrocortisone. In arthritis of the hip, a weight reduction program, crutches or canes, may be of help.

I shall let Dr. Heck tell about the use of cortisone and ACTH. I think one can safely say that, almost without exception, steroids should never be administered systemically. Rarely is there enough synovitis in the hip or knee joints to justify the use of steroids, but if such a case should occur, small doses may be used for a short time.

MODERATOR ENSIGN: Does anyone wish to take exception to any of the statements made?

DR. ROSENBERG: I cannot believe that injections benefit distant osteoarthritic lesions; perhaps the joint at the site of the injection may receive some temporary benefit.

DR. RUML: I agree that it doesn't influence the process in general. Occasionally, a slightly warm knee with no fluid will be benefitted by the intra-articular injection of hydrocortisone. Certainly, there is a large psychic effect from any injection.

DR. ROSENBERG: How does the result compare with that of injections of saline or procaine?

DR. RUML: Procaine would give temporary relief, but I think that the intra-articular injection of cortisone into a warm knee may be of benefit.

DR. WARD: Hydrocortisone given intra-articularly for osteoarthritis is particularly helpful for the acute flare-up. It should be used in conjunction with the other measures of treatment that Dr. Ruml outlined. A frequent mistake is to inject hydrocortisone into a knee and then allow the patient to overuse the knee; articular degeneration will be increased by the abuse of the joint, even though the pain may be relieved temporarily after injection of hydrocortisone.

MODERATOR ENSIGN: Dr. Heck, have you any comments from an orthopedic standpoint?

DR. CHARLES V. HECK: I would divide the treatment into two phases, nonoperative and operative. Nonoperative treatment includes the use of hydrocortisone injections. They do more good than injections of saline or procaine.

MODERATOR ENSIGN: Dr. Rosenberg, I believe that you are out-voted on that.

DR. ROSENBERG: I should still like to be shown.

QUESTION: I should like to ask about so-called vitamin deficiency in arthritis. What role do vitamins play in arthritis, and how should the vitamin deficiency be treated?

DR. RUML: I believe that nothing more than a well-balanced diet is indicated, even in weight reduction. I do not prescribe vitamins unless there is a clear-cut vitamin deficiency, which is a rare occurrence.

SAME QUESTIONER: If you find that the serum calcium level is low, do you give calcium, or do you prefer dietary means?

DR. RUML: If the calcium level were low enough, I would treat it.

SAME QUESTIONER: What type of calcium would you use?

DR. RUML: Calcium lactate offers little, but calcium phosphate and viosterol seem to be of benefit.

DR. WARD: The serum calcium level is not low in osteoarthritis.

SAME QUESTIONER: Do you think it plays any part?

DR. WARD: A deficiency of serum calcium plays no part in osteoarthritis.

MODERATOR ENSIGN: What about the use of phenylbutazone?

DR. RUML: It has value. Phenylbutazone can be useful, but the patients must be selected carefully. It must be remembered that the substance has a high degree of toxicity. The patient must be extremely reliable and faithful. An individual with osteoarthritis of such magnitude that he has not been adequately relieved by the usual conservative measures should have a trial of phenylbutazone, provided he does not have heart failure and has neither an ulcer nor a history of ulcer. Initially, the dosage should be between 300 mg. and 400 mg. a day. Its effectiveness can be determined at the end of a week. If there is clear-cut improvement, the dosage can be reduced gradually to 100 mg. or 200 mg. a day, and occasionally to as little as 100 mg. every other day. Patients receiving phenylbutazone should be seen frequently during the early course of its administration when toxic reactions tend to occur, that is, within the first two months. If there is peripheral edema, the body weight must be followed carefully. Diuretics such as Diamox may be helpful. Inquiry should be made as to symptoms of any type, such as skin rashes and gastro-intestinal disturbances. Each patient should have frequent white blood cell and differential counts because of the danger of depression of the bone marrow.

DR. ROSENBERG: Do you permit the use of aspirin in conjunction with phenylbutazone?

DR. RUML: Aspirin can be used with phenylbutazone. Some of the other anti-inflammatory agents cannot be counted on for much help. About 30 per cent of patients will have some kind of toxic reaction to phenylbutazone. In about

half of these, the drug will have to be discontinued. I would not recommend its widespread use.

MODERATOR ENSIGN: In other words, it should not be given liberally.

DR. RUML: It should be held in abeyance. It can be tried in case of necessity.

MODERATOR ENSIGN: Dr. Rosenberg, we know the unsightly appearance of Heberden's nodes, but is pain associated with them? Will you tell us about them?

DR. ROSENBERG: Heberden's nodes may be unsightly, even disfiguring. Persons affected picture a future life of invalidism, and there is often a notable emotional disturbance.

One responsibility of the physician is to explain the relatively benign nature of osteoarthritis. In fact, such an explanation may be the only therapy required. If discomfort is severe, however, further treatment may be necessary. In general, conservative measures can be used, such as physical therapy, warm baths, salicylates for pain, and phenobarbital to allay anxiety and to secure rest. Large, unsightly nodules may be removed surgically.

Although symptoms of osteoarthritis may be temporarily relieved by steroids, no permanent effect is obtained and the benefits rarely justify this rather delicate therapeutic procedure.

MODERATOR ENSIGN: Dr. Heck, will you tell us what the orthopedic surgeon can do to help in the case of localized manifestations of osteoarthritis?

DR. HECK: It is better to consider them in groups, taking those of the spine first. Changes in the lower cervical region, as high as C5 and C6, are common in all of us. Most patients with these changes have difficulty with the neck region in the morning. Some of them say they cannot move the neck around until it snaps. Further irritation to a joint that is already irritated enough to cause crepitation probably means that increased proliferation is taking place around the joint. In these nonoperative patients, we explain the problem and the reason that the patient should not twist his neck to get the "morning snap."

If the pain is sufficient, a traction device may be used. Traction can be gained in any number of ways. The most difficult is in the hospital bed with the patient on his back. Most patients can have some form of traction at home. A still simpler means is the collar or neck support that provides ambulatory traction. The use of such devices usually makes it possible for patients to work. As they experience considerable fatigue, rest periods of from three to ten minutes frequently are helpful. The collar or neck device will reduce the fatigue and ultimately the symptoms.

Rarely is surgery (open surgical fusion of the cervical spine) indicated, but occasionally it is necessary. If a patient has severe involvement of the cervical spine, localized fusion of two, three, or more involved joints may be considered. This is not a serious procedure, if performed correctly, and it is usually well tolerated.

Local arthritis of the dorsal spine may cause backache of such degree as to awaken the patient so that he must get up, move around, and perhaps stay up. We used to stress the necessity of a hard bed for this condition, but have found

that some of these patients do much better on a soft bed. We tell them to experiment with different types of mattresses.

As we grow older, we all have a normal rounding of the upper back with changes in the joints sufficient to cause symptoms. Some people have to arise early in the morning to straighten out the back. With advancing age there is frequently an extension of the dorsal rounding and production of symptoms. In the morning, we stand more erect and sit straighter; this tends to induce strain in the lumbar area, because of lordosis.

There may be lower lumbar pain in addition to dorsal pain. In these instances, the patient either bears the pain or uses a corset or other type of external support. Such a support should not be worn for more than half a day. If the patient gets along well, he can dispense with it. If he wears the support too long, all the structures become soft and inefficient and pain becomes more severe despite the garment.

In certain instances, surgical fusion of segments of the dorsal or lumbar spine can be performed, but only with full knowledge that by thus eliminating a joint or a series of joints, strains are shifted and become abnormal so that the remaining joints may wear out more quickly. There is no recourse from such results.

In the region of the shoulder, osteoarthritis involves chiefly the acromioclavicular joint. The periodic injection of an anesthetic agent sometimes gives relief. If this fails, resection of the distal end of the clavicle may be of benefit in a small percentage of patients. Osteoarthritis of the scapulohumeral joint is not common, and therefore is not a problem that causes much concern from a surgical standpoint.

Changes about the hip are numerous and varied, and must be considered from the standpoint of the patient's physiologic rather than chronologic age. When there is a broad, flat, irregular femoral head with a large area of degeneration, what should be done? I prefer to treat the condition as long as possible with nonoperative measures, because anything we have to offer surgically fails to approach a normal hip joint. If the patient can carry on his livelihood and move about fairly well, I prefer to avoid surgery. However, if the patient is so disabled that he cannot carry on his occupation or make his living, and if his physiologic age is such that some benefit can be achieved, then there is a choice between fixing the hip, making it stiff, or performing arthroplasty. The choice is difficult. As a rule, arthrodesis of the hip in older persons is unsatisfactory. They have great difficulty in moving about and even in sitting. If there is an arthritic process in the back, it begins to cause pain because of the added strain induced by the stiff hip.

The two general types of arthroplasty in use today are the well known cup arthroplasty and the so-called prosthesis or replacement arthroplasty. In choosing between cup and replacement types, I try to estimate how long the patient is likely to live and be active. If he may survive and be efficient for more than ten years, I prefer cup arthroplasty, because it will tolerate strains over a longer period of time. If the patient will probably not be efficient or survive for ten years, I choose replacement arthroplasty, because it allows more rapid ambula-

tion and will probably give service for more than five years. Beyond that time, we don't know what the results will be; ten years from now, we shall know more about the subject.

In other joints, the same principles apply. In the foot, hallux rigidus (stiffness of the first toe) is often difficult to handle. The nonoperative approach is to advise the wearing of a stiff-shank wide shoe, which is adequate to house the toes and allow extension of the first metatarsophalangeal joint. Most patients obtain satisfactory results with such therapy. In those who do not, arthrodesis of the joint or arthroplasty can be performed, neither of which is particularly satisfactory.

Time is insufficient to deal with the knee, elbow and wrist. An important point which merits stress is that every patient with rheumatoid arthritis has osteoporosis.

MODERATOR ENSIGN: Thank you, Dr. Heck.

We shall now talk about rheumatoid arthritis, the other major type of chronic joint disease. Rheumatoid arthritis of the chronic type is the "crippler." This serious disease requires treatment with every known means, particularly measures to forestall crippling contractures and ankyloses.

Rheumatoid arthritis commonly begins between 20 and 40 years of age, but may appear at any time of life. Most people have some degree of osteoarthritis by the time they reach the age group about which we are talking today. This may lead the radiologist to see the whole picture as osteoarthritis. Clinically, one sees other aspects and has to decide whether the disease is in an early or a moderately advanced stage. This is a serious decision.

We are learning more about factors contributing to rheumatoid arthritis, but we do not know the specific etiologic factors. Therefore, we have no cure. In many instances, however, good management and treatment can control the disease. The most that we can do is to apply the best of our current knowledge, in the hope that we can keep the patient comfortable and control the progress of the arthritis until a cure or specific treatment becomes available.

When the hands are affected, there is usually bilateral symmetrical involvement. Characteristically, the proximal interphalangeal joints manifest spindle-shaped swelling, and frequently the metacarpophalangeal and carpal joints are affected. Later, ulnar deviation of the fingers and contractures may develop. Usually, involvement in the feet, ankles and knees is also bilateral and symmetrical. Rarely, one joint may be affected, particularly early in the course. The disease is usually progressive, with marked systemic manifestations. In many instances weight loss, low-grade fever, and anemia are observed. The disease process, whether it occurs in a person 60 years old or 10 years old, is essentially the same, although it may have different aspects.

Among conditions related to typical rheumatoid arthritis is Felty's syndrome, which is rheumatoid arthritis with splenomegaly and leukopenia. Still's disease is rheumatoid arthritis in children. Involvement of peripheral joints, indistinguishable from typical rheumatoid arthritis, occurs in about 20 per cent of patients with rheumatoid spondylitis. The arthritis accompanying psoriasis in

many cases cannot be differentiated from rheumatoid arthritis. Another group of diseases, the cause of which is not clear-cut, may have a close relationship to rheumatoid arthritis. These so-called "collagen diseases" include systemic lupus erythematosus, periarteritis nodosa, scleroderma, dermatomyositis, and sarcoidosis. In any of these conditions there may be joint changes resembling those in rheumatoid arthritis and requiring accurate differential diagnosis.

In the older age group, there are two distinct types of problem. A person may have enjoyed good health up to 55, 60 or even 75 years of age, and then rheumatoid arthritis develops. On the other hand, the disease may have developed in early life, and either treatment has been inadequate or, despite treatment, multiple deformities have developed which are uncorrectable. The important thing in the individual case is the activity of the rheumatoid disease at the time the patient presents himself. Everything possible must be done to "put out the fire," that is, to halt further progression of the disease. Many of these things are hazy and hard to pinpoint. It can be made easier if we discuss briefly the general approach to the treatment of rheumatoid arthritis, particularly in older patients.

Dr. Rosenberg, will you tell us the treatment you would recommend when you see a patient with rheumatoid arthritis?

DR. ROSENBERG: First of all, the situation of each patient must be evaluated separately. Some will have had the disease a short time and yet be severely debilitated. Others will have had it a long time and will be severely deformed. Some will have had rheumatoid arthritis in a mild form. Treatment should be designed to fit the needs of the individual.

Activities should be planned in accordance with the severity of the disease. If the process is active and debilitating, activity should be markedly restricted. If the disease is mild, the patient may do more. If the patient is thin, a diet rich in calories should be prescribed. If he is overweight, he should be encouraged to reduce.

Attention should be given to possible foci of infection, such as bad teeth, prostatitis or cervicitis. I also believe in physical therapy.

As for medications—analgesics, aspirin and phenobarbital are used in mild cases. In addition, gold and various steroid hormones are effective.

These are basic points for consideration in planning treatment for the average patient with rheumatoid arthritis.

MODERATOR ENSIGN: In other words, the basic program takes all of these things into account. We are apt to forget that rheumatoid arthritis patients need more rest. It seems to me fundamental that we treat the patient, and not the joint alone. If the disease is seen in the first six months or the first year, it can often be treated with salicylates without the necessity of using more expensive and hazardous preparations.

DR. ROSENBERG: Yes, initial therapy may be decidedly simple if the disease is mild, but the patient should be re-examined from time to time, as the situation may change.

MODERATOR ENSIGN: Dr. Heck, what can the orthopedist do to prevent deformities?

DR. HECK: Without question, prevention of deformity is better than trying to treat a deformity after it has occurred. Muscle spasm with contracture of a joint is a frequent finding. The nurse is likely to put a knee with a contracture on a pillow. It is better to have the patient exercise as best he can in bed. The best exercises for the upper back are stretching by putting the arms above the head, and deep breathing. Exercises must be supervised, as patients forget to exercise unless someone reminds them. If the pain in the lower extremities is not too great, some motion can be carried out.

Occasionally, a splint must be relied upon to maintain proper position, but splints should not be used at all times. They should be removed during exercise and the patient allowed to extend his legs. Of course, some joints will be so badly damaged that the end-result will be spontaneous arthrodesis. If this seems likely, it is best to put the joint into the optimal position. A knee that obviously will become fused should be placed in such a position that the patient will have an extremity that functions reasonably well.

These are the chief points in prophylaxis. For definitive care of a deformity, it is better to wait until the disease has burned itself out.

MODERATOR ENSIGN: Dr. Ruml.

DR. RUML: I am certain Dr. Rosenberg did not intend to raise a question as to foci of infection. It is good medical practice to remove an abscessed tooth, but it should not be expected that arthritis will improve. We think the same about any abscessed or diseased organ, but the idea is not that removal will cure arthritis.

DR. ROSENBERG: I agree, but let us not forget that occasionally infected foci appear to play a more vital role in this disease. Rarely, removal of definitely infected tissue may be followed abruptly by subsidence of the disease.

MODERATOR ENSIGN: I should like to re-emphasize the point that one cannot treat arthritis—one must treat the patient. It is necessary to know the type of arthritis before starting treatment. It is extremely important that the diagnosis be based upon a complete history and a physical examination with a detailed systemic review; that is, a complete evaluation with a good differential diagnosis. Once the diagnosis of rheumatoid arthritis is established, we know that we are dealing with a hazardous condition. This is not the case, however, with osteoarthritis, which proves to be the diagnosis in the majority of older patients.

I shall ask Dr. Ward to open the discussion on the use of steroids.

DR. WARD: One of the first points to consider is the aim of treatment of rheumatoid arthritis with the cortisone-like steroids. These substances are not curative. They suppress the inflammatory reaction during their administration. Such suppression may be fairly complete, or it may be partial, but the effect does not persist long after administration of the steroid is stopped. So far as is known at present, these substances have no effect on the cause of the disease. As a result, treatment may need to be continued for an indefinitely long time. Therefore, the current aim is to employ these steroids, when indicated, in conjunction with other appropriate measures of treatment to suppress the rheumatoid inflammation as much as possible with doses that do not lead to chronic

hypercortisonism. The patients to receive these steroids must be chosen with discretion. The indications for the use of these compounds in rheumatoid arthritis are as follows: First, the rheumatoid arthritis should be in an active rather than a quiescent phase. One must not expect to restore non-inflamed, badly damaged joints to normal through the use of steroids. If there is no inflammation, results cannot be expected from the administration of cortisone-like drugs in arthritis. Second, the disease should be severe enough, despite an adequate trial of general measures such as physical therapy, aspirin, and increased rest, to justify the risk and expense of steroid therapy. Another requirement is a co-operative patient. If the patient is not co-operative, difficulty may be encountered in control of dosage and other measures.

Certain conditions are aggravated by the cortisone-like steroids. The presence of one or more of these disorders in the patient with rheumatoid arthritis may serve as a contraindication to the use of these drugs. Some of these conditions are absolute contraindications to prolonged steroid therapy: active or recently active tuberculosis, psychosis, Cushing's syndrome, and infections that cannot readily be controlled. In addition to these absolute contraindications there are certain relative contraindications: peptic ulcer, diabetes, osteoporosis, certain types of intercurrent infection more readily controlled by specific therapy, cardiovascular and renal insufficiency, convulsive disorders, severe psychoneurosis, or lack of co-operation on the part of the patient.

Whether or not to use these agents for patients who present relative contraindications has to be decided on an individual basis. For example, in patients who have peptic ulcer, the use of steroids generally is avoided; but if the rheumatoid arthritis is virtually incapacitating and the patient cannot be managed in any other way, then steroid therapy may be seriously considered. The same line of reasoning can be applied in the presence of the other relative contraindications.

At present, four practical antirheumatic steroids are available: cortisone, hydrocortisone, prednisone and prednisolone. The latter two have the interesting property of exerting less effect on the metabolism of sodium, potassium and chloride than do cortisone and hydrocortisone. This is particularly advantageous when large doses must be given or when the patient has a predisposition to disturbances of these electrolytes. Otherwise, prednisone and prednisolone have no apparent advantage over cortisone and hydrocortisone. Corticotropin (ACTH) is an effective antirheumatic agent but has two disadvantages: it requires injection, and the regulation of dosage is somewhat less certain than with cortisone and related agents, since the additional factor of the response of the adrenal gland to corticotropin is involved.

Dosage of these steroids is a matter of adjustment to the needs and tolerance of each patient. The importance of proper dosage can hardly be overemphasized. My colleagues and I seldom employ large initial, priming doses for patients with rheumatoid arthritis now, but rather start treatment with doses that we estimate may be within the range of tolerance for prolonged administration. When the patient's condition permits, gradual small reductions are made (for example,

decrements of 0.5 to 1 mg. of prednisone about every one to two weeks). If hypercortisonism develops, the dose is reduced similarly, to permit disappearance of the unwanted effects. For flare-ups of rheumatoid arthritis, slight temporary increases in dosage may be required, but reduction of dosage should follow soon thereafter.

Although tolerance for these steroids varies considerably, hypercortisonism develops in many patients if the following daily dosages are maintained or exceeded for long periods: for men, 10 mg. of prednisone or 50 mg. of cortisone; for postmenopausal women, 6 mg. of prednisone or 30 mg. of cortisone; for other women, 8 mg. of prednisone or 40 mg. of cortisone. The tolerance is even less in some patients. This program of dosage often means some compromise in the results. One sacrifices a bit of the anti-inflammatory effect in order to avoid the consequences of prolonged hypercortisonism.

MODERATOR ENSIGN: Dr. Ruml, will you please give us your ideas as to choice of preparations and dosages, if they differ from those of Dr. Ward.

DR. RUML: I have nothing really different to offer. The only thing is that the use of salicylates will permit a much lower dosage of steroid, whether it be cortisone or one of its derivatives. Patients can thus be maintained for a long time with a suboptimal dosage.

I should like to raise a question. Does not the presence of an ulcer, one of the relative contraindications, represent a situation wherein the physician should rely on gold? I have not had a great deal of experience with gold, but Dr. Ward has.

DR. WARD: Dr. Ruml's point about aspirin is well taken. I also wish to emphasize the desirability of using other treatment along with steroids. Every one of the measures in a good general program, as previously mentioned, should be continued during administration of cortisone. In other words, use all indicated helpful measures and do not depend on one alone.

MODERATOR ENSIGN: Does anyone think that by giving salicylates and steroids combined in fixed proportions in one tablet—the so-called "super aspirin" of *Reader's Digest* fame—any worthwhile advantage is attained?

DR. RUML: I think it unsound to give mixed medications. If steroids and salicylates are to be used, they should be used separately and in the proper dosages. If the medications are given in combination, it is not possible to control both.

QUESTION: Is there any objection to giving codeine with aspirin?

DR. RUML: There is a real objection. One must think of arthritis as meaning years and decades of trouble. Unfortunately, some people become addicted to codeine. I agree that it is fine to use a preparation containing codeine for a short time, but it is unwise to do so permanently.

DR. ROSENBERG: I consider that physicians may administer these preparations with good results. There is no undue risk so long as the physician knows the composition of the tablets he is using and so long as he is duly watchful for the difficulties which may result. Under these circumstances, I don't see that any serious harm is likely to result from their use.

MODERATOR ENSIGN: It is important that the physician using these combina-

tions realize that, in addition to salicylates he is giving potent steroids with dangerous potentialities even in small dosage. The basic program must be continued during the administration of steroids. In rheumatoid arthritis, a remission cannot be secured with steroids alone; combined treatment is necessary.

DR. RUML: Whether to use prednisone or prednisolone, is a matter of choice. They are equally effective.

MODERATOR ENSIGN: What can be done to control the side-effects of steroids?

DR. ROSENBERG: That is largely a matter of controlling and regulating the dosage. Regulation can be overdone through fear that some difficulty may be encountered. It seems to me that the goal for a physican using steroids ought to be the control of arthritis. If that requires a somewhat larger dosage than is used by my conservative colleagues, I am in favor of it. Rheumatoid arthritis is a terrible disease. If uncontrolled, it produces some of the most tragic, crippling disabilities seen in the whole realm of medicine. These patients are pathetic. The program of treatment should not be regulated to the point where the physician is strangled in his attempts to help the patient. If some side-effects are produced, they can be treated. In dealing with rheumatoid arthritis, the proper course is to do the best possible as carefully as possible, warning the patient about the difficulties that may occur and yet not frightening him. The outlook for rheumatoid arthritis patients today, with all the measures available, is a great deal better than formerly. We ought to aim for a good result and not necessarily toward a low dosage.

DR. RUML: I would add that that is the aim over a long period of time.

DR. ROSENBERG: Rheumatoid arthritis is not to be overcome in a short time. We must keep in mind, however, that reduction in dosage can be overdone. The daily dosage can be reduced to a point where nothing is accomplished and the patient is miserable. A happy medium should be sought.

As to choosing the most favorable compound, prednisone and prednisolone have notable advantages for most patients, because of the diminished electrolyte effect. Rarely, a patient may not tolerate these compounds but does respond to cortisone or hydrocortisone. There is some advantage to having all four available.

MODERATOR ENSIGN: I should like to mention one disadvantage of starting with large suppressive doses. The patient may be made so comfortable that he is reluctant to give up any part of that comfort. It is better to start with a moderate dosage and achieve 50 or 75 per cent improvement, maintain it for a while, and then, if the improvement is not satisfactory, again increase the dosage. Once the patient has known the almost miraculous improvement from tremendous dosages of steroids, it will be hard to reduce the amount. It is easier from the standpoint of handling the patient to move in the other direction.

I agree that we do not expect to cure the disease. We need to watch that we do not make the patient too comfortable, for in that case he will overuse damaged joints and ultimately there will be more damage than there would have been otherwise. It must be borne in mind that, in many cases, the disease progresses while steroids are controlling it symptomatically. It is a matter of the calculated hazard from the disease versus the hazard of treatment.

DR. RUML: Occasionally, in a patient who is bedridden with severe involvement, steroid therapy should be commenced with large doses and then the dosage reduced to a maintenance level.

MODERATOR ENSIGN: It is well to remember one thing about steroids. They are not a specific treatment, but a supplement to general measures in therapy. We still use the basic measures employed years ago, that is, rest, heat, massage, graded exercise and salicylates.

Is there anything more that should be said about steroids?

QUESTION: A great deal is heard about suppression of the adrenal cortex. How long does adrenocortical suppression last after steroids are discontinued?

DR. WARD: In some persons the pituitary-adrenocortical mechanism may be suppressed for only a few weeks after prolonged treatment with one of the cortisone-like steroids, whereas in others the suppression may persist for a few or several months. Unfortunately, currently available practical tests do not assess with any degree of accuracy the ability of the pituitary-adrenocortical mechanism to respond to stress. Patients who are being treated with steroids or who have recently had such treatment should be protected against pituitary-adrenocortical insufficiency in case of increased stress (trauma, infections or surgical procedures) by the temporary administration of increased quantities of steroids. For example, a cortisone-treated patient who requires operation generally is given 200 mg. of cortisone intramuscularly forty-eight hours, twenty-four hours, and again one hour before operation, and 100 mg. intramuscularly the first day after operation. Within the next few days, the dosage can be reduced to the appropriate maintenance level unless some complication necessitates increased or more prolonged dosage.

MODERATOR ENSIGN: I had hoped we would have time to say something about the use of gold, which I personally favor as supplementary treatment in active rheumatoid arthritis.

DR. ROSENBERG: Gold therapy appears to me to be notably effective in certain patients with active and progressive disease. Gold may contribute something of value. The amount administered may be adjusted according to the progress of the patient. I prefer dosages in the neighborhood of 10 to 25 mg. once or twice weekly. Combinations of gold therapy with relatively small doses of steroids have been satisfactory in many instances.

MODERATOR ENSIGN: We should like to have Dr. Heck tell us what can be done surgically when rheumatoid arthritis is under good control as far as the active process is concerned, but some deformity or irreversible condition remains. What do you think about surgery in these circumstances?

DR. HECK: The common deformities in the hands are deviations of the fingers. Sometimes the deviations are so great as to amount to contractures which prevent use. Partial contracture of a ray in the region of the proximal phalanges often can be improved by performing an arthroplasty; improved position of the fingers and improved function of the hands results. Occasionally, a painful wrist in poor position will respond well to splinting. In the forearm, the distal end of the ulna can sometimes be resected. If the joints are fixed, a measure which provides

motion is always welcome. A patient who may ultimately have two fused elbows should undergo operation on at least one elbow, in order to be able to feed himself. As the procedure may not completely restore function, the risk of a double failure is not justified.

The hips generally present the greatest problem. Some type of arthroplasty should be carried out. The cup type is probably the better of the procedures. The cup may sometimes break down, if the disease again becomes active. When a patient has one fairly good hip, and one painful hip, the head of the latter may be resected. It is surprising how well some of these patients fare. They are comfortable and have fairly good motion. Some can actually walk well by using a cane. When both hips are involved, the function of the knee joint is sometimes sufficient to allow fusion of one hip and arthroplasty of the other.

In the case of marked hallux valgus, resection or correction of deformities of the toes may suffice. The deformity may be so great (*e.g.*, hammer toes) as to necessitate resecting an entire ray.

Any number of procedures may be necessary to improve the comfort of the patient. The primary purpose is that the disease become burned out; if surgery is performed before this occurs, only grief can be expected.

Regardless of one's specialty, aids to recovery of function must be supervised. Many of these belong in the department of physical medicine, but a physician should see that the treatment is carried out; in fact, any such form of therapy should be under the advice of the physician in charge. Parallel bars may be improvised. Walkers of all types, with or without wheels, should be used to help patients become ambulatory. Swimming pools are helpful. Frequently, a patient can walk better in water because it supports the body weight. This is an excellent way to train patients who have been in bed. Numerous other aspects of physical medicine apply to rehabilitation.

MODERATOR ENSIGN: I should like to call your attention to a useful booklet on rheumatoid arthritis. It is called "Home Care in Rheumatoid Arthritis," and is available from the Arthritis and Rheumatism Foundation, 23 West 45th Street, New York. Every patient with rheumatoid arthritis should have a copy. It sells for about 10 cents. I believe that in some areas the local chapters of the Foundation are providing copies to physicians without charge. The booklet discusses, among other phases of therapy, the application of physical therapeutic measures at home.

We should now like to discuss gout. Gout is probably the most frequently missed diagnosis among rheumatic diseases. Yet, it is a disease in which, if properly diagnosed, satisfactory results can be obtained. The primary requisite for diagnosis seems to be a high index of suspicion, that is, to have it in mind and to realize its everyday occurrence. It is not a rarity. It is essential to diagnose this disease before it progresses. Gout is a disorder of metabolism. Arthritis is a manifestation of gout. As this is a panel on rheumatic diseases, we shall limit ourselves largely to acute gouty arthritis and tophaceous gout.

Dr. Ruml, will you mention briefly the factors that should make one think of it?

DR. RUML: First of all, the history is invaluable. Early in the course, this condition is rarely bilateral and is usually monoarticular. The discomfort is commonly experienced upon awakening in the morning, lasts two or three days, and then disappears without residual effects.

MODERATOR ENSIGN: Must the involvement be of the big toe?

DR. RUML: No, it may strike almost any joint, but about 50 per cent of patients will at some time have involvement of the great toe. The attacks tend to become more frequent and severe as the years pass. Frequently, there is a family history of gout. There may also be a history of renal stones. The first attack may have occurred after a minor operation, such as a herniorrhaphy. The history may include treatment with penicillin of what may have erroneously been thought to be an infectious process.

Direct examination of an acute gouty joint, usually leaves no question as to the diagnosis. There is a hot, tender, exquisitely painful lesion. There may be some pitting edema, or at least obvious swelling; there is rarely any fluctuation. The joint is often discolored; it may be red or even purplish. Tophi may be present. They may be found about any joint, but they occur more frequently on ulnar surfaces and about joints previously involved. However, tophi are not necessary for the diagnosis of gout. If a joint is involved frequently, the probability of associated tophi is much greater.

In gout, roentgenograms may show renal stones. However, uric-acid stones will not be shown unless a radiopaque dye is used, because they are radiolucent. Approximately 50 per cent of patients will have a normal blood level of uric-acid during an acute attack. It becomes elevated after the attack subsides. The presence of an elevated temperature, elevated white blood count, and elevated sedimentation rate are often misleading, but are not uncommonly associated with an acute attack.

One other type of test which is helpful in diagnosis is the response to therapy, whatever it may be.

MODERATOR ENSIGN: The therapeutic response is the key to diagnosis. Some patients who have had one, two, three, or many acute attacks of gouty arthritis have no tophi in either bone or soft tissue. Often the normal blood uric-acid level at the time of the acute attack is due to the fact that the patient has been taking aspirin, which increases the urinary output of uric acid.

Dr. Heck, you must see some cases of gout in the acute stage. How do you handle it in the Orthopedic Clinic?

DR. HECK: We see a few patients in the acute stage, but the surgical attack is more or less limited to two phases. One is that of diagnosis. When the lesion is suspected, biopsy is a diagnostic aid. The second phase is that of removing any tophi that may be causing difficulty. You might ask, when should they be removed? They are removed when they are mechanical barriers and when they interfere with motion; they are not removed for cosmetic purposes.

MODERATOR ENSIGN: Before we proceed to the treatment of acute gouty arthritis, I should like to ask Dr. Rosenberg whether, in his experience, there is anything peculiar about gout as manifested in older persons. Is there anything to

indicate that it is seen more often in persons over the age of 40 years? What complications should be watched for in the patient with gout?

DR. ROSENBERG: Clinical manifestations of gout generally conform to the classic pattern. However, the rate of progression differs in each person. In general, when the onset of symptoms is early in life (before the age of 30 years), the speed of development or rate of progression is likely to be greater than in persons in whom the onset is at a later age.

Visceral complications of gout, especially arteriosclerosis and nephritis, are factors in an unfavorable outcome in many instances. Cerebrovascular accidents and episodes of myocardial infarction are apt to characterize a final illness. Arterial hypertension and renal insufficiency are observed with unusual frequency among patients with gout. Renal damage may result either from arteriolar changes or from deposits of urates in the renal parenchyma.

MODERATOR ENSIGN: Let us return to acute gouty arthritis, to the man who awakens in the morning and cannot put his foot on the floor. It may be the first attack or the fifth, which still has not been diagnosed. Some patients will have had fifteen, twenty, or twenty-five attacks. I have seen a man who by his history had his first attack of acute gouty arthritis when he was a university freshman and who lived to the age of 72 years before the diagnosis was made. Dr. Ward, what is the currently accepted treatment for acute gouty arthritis?

DR. WARD: Fortunately, we now have several helpful means of treatment for these attacks. Colchicine remains the drug of choice in most instances. It should be administered at the first sign of the attack. We usually give $\frac{1}{50}$ grain (1.30 mg.) initially and then $\frac{1}{100}$ grain (0.65 mg.) every two hours until diarrhea occurs. In certain cases, especially postoperatively, colchicine can be used to advantage intravenously.

The cortisone-like steroids, or ACTH, and phenylbutazone (Butazolidin) also suppress acute attacks. In some patients in whom the use of colchicine is not feasible or successful, one of these other medicaments can be employed.

In addition to colchicine or alternative medication, certain other measures are indicated for management of the attacks of acute gouty arthritis. A low purine diet and a uricosuric agent should be continued during the acute attack. The application of hot or cold packs (whichever feels better) and the administration of analgesic drugs may afford considerable relief until more specific treatment has a chance to exert its effect. Joints should be put at rest during the attack. Overuse of the involved joints almost always prolongs the attack.

MODERATOR ENSIGN: Our Chairman has just warned me that, due to a misunderstanding on our part, we do not have the additional twenty minutes we had hoped for in which to discuss the interval treatment of gout, the treatment of chronic tophaceous gout, and some of the other commonly observed rheumatic conditions in the aged. We, therefore, regretfully conclude this panel discussion at this point.

THE PLACE OF ANTICOAGULANT THERAPY IN ACUTE MYOCARDIAL INFARCTION

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There is no agreement at present regarding the indications for anticoagulant therapy in acute myocardial infarction. In spite of the persuasive arguments in defense of the recommendation that this form of treatment be employed in all cases when no contraindications exist (1), strong contrary opinion has developed in favor of withholding these agents from patients who have had a clinically mild infarction. Although physicians today have no hesitation in voicing their opinion regarding the school of thought to which they adhere, some five or six years ago relatively few practitioners would have been courageous enough to admit that they had withheld anticoagulants in cases of acute coronary occlusion when no contraindications were present. During that period many physicians hesitated to exercise their own judgment because of the fear of criticism or possible litigation for malpractice if death or complications were to develop in their patients not receiving these drugs (2). As a consequence, anticoagulants were often employed in "token" dosage without any sincere attempt to achieve prothrombin-time values within the therapeutic range. Today although there is no unanimity of opinion as to the indications for this form of therapy, the decision of the practicing physician is now based on clinical judgment or personal belief rather than upon fear or dogma.

The uncertainties regarding the possible benefits from anticoagulant therapy have stemmed largely from the failure of the Committee on Anticoagulants of the American Heart Association to supply data reflecting the outcome in clinically mild attacks. Wright has attempted to fill this gap by a retrospective analysis of the "good-risk" cases in the Committee's series but has failed to cast any light upon this problem because of the paucity of such patients in that study. Many physicians however subscribe to the regimen of "routine" anticoagulant therapy, simply on the basis of the persuasive evidence offered by a lessened overall morbidity and mortality in unselected groups. Since it has been traditional in medical teaching to emphasize that the outcome of acute myocardial infarction is always "unpredictable because of the constant threat of sudden unexpected death even for persons convalescing favorably" (3), many physicians do not question the desirability or necessity of utilizing this form of treatment in patients sustaining an uncomplicated first attack. Indeed, although the treatment of each case according to its own merits is the prime ingredient of good medical practice, this pessimistic concept of prognosis has long been the cause of a formalized and stereotyped method of treatment for all cases of coronary occlusion without regard to the mildness or severity of the attack. It is this attitude toward prognosis, therefore, which largely accounts for the strong prevailing tendency to overtreat patients with myocardial infarction.

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Nevertheless, our studies have demonstrated that the outcome in acute myocardial infarction can actually be predicted with an unusually high degree of accuracy in patients sustaining an uncomplicated first attack (4, 5).

ANTICOAGULANT THERAPY AND THE MORTALITY RATE

Thromboembolism. In 489 mild or "good risk" cases of acute coronary occlusion admitted to three New York hospitals (Table 1), the death rate was 3.1 per cent; and if survival extended beyond the first two days of admission the recovery rate was 99 per cent (6–8). The death rate in this large segment of cases of coronary occlusion was less than that commonly recorded for pneumococcic pneumonia under modern antibiotic therapy. Moreover, in these selected patients the incidence of thromboembolism was found to be so low as to challenge the need for anticoagulant therapy in their management. Analysis of the cause of death in this group indicated that the preventable mortality under ideal anticoagulant therapy could not have exceeded 1 per 100 cases, even if all deaths of unknown cause were attributed to thrombotic or thromboembolic episodes. Thus, in the low-risk group of cases, the possible benefits from anticoagulant drugs must be weighed against the risks inherent in their use.

Differentiation of cases. All the available evidence would indicate that by assessing eight important signs and symptoms, it is possible to determine whether or not a patient is a "poor risk" requiring anticoagulant drugs or a "good risk" requiring only the more traditional methods of management. To make this differentiation, we have listed the following as poor prognostic signs: 1) a history of previous myocardial infarction, 2) intractable pain, 3) an extreme degree or persistence of shock, 4) significant enlargement of the heart, 5) gallop rhythm, 6) congestive heart failure, 7) auricular fibrillation or flutter, ventricular tachycardia, or intraventricular block, and 8) diabetic acidosis or other states predisposing to thrombosis. We are convinced that in patients without these serious manifestations the danger from thromboembolism under conservative management is no greater than that arising from hemorrhagic complications associated with anticoagulant therapy.

Hemorrhagic complications. The Committee on Anticoagulants, working with teams of research fellows, residents and staff members in many of the leading medical centers in the United States, and assisted by the most reliable laboratory facilities, observed hemorrhagic complications from anticoagulants in 7 per cent

TABLE 1

Mortality Rate and Incidence of Thromboembolic Complications

(Three New York hospitals)

	No. of Cases	Mortality		Embolization	
		No.	Per Cent	No.	Per Cent
Total	1,047	350	33.4	63	6.0
Good risk	489	15	3.1	4	0.8
Poor risk	558	335	60.0	59	10.6

of their first series (1) and in 13 per cent of their second series; the death rates from hemorrhage due to anticoagulants were 0.7 per cent and 1.1 per cent, respectively. After careful consideration of all clinical and necropsy findings, Wright *et al.* recently estimated that 1.7 deaths per 100 cases resulted from anticoagulant therapy itself (9, 10). It is true, however, that in "good-risk" cases treated with anticoagulants the incidence of hemorrhagic complications may be somewhat less than these figures indicate. With newer anticoagulants and meticulous care, some have claimed a negligible incidence of hemorrhagic complications. Nevertheless it must be remembered that, as a cause of death, hemorrhagic episodes may be even more elusive than thromboembolic phenomena, their presence often being revealed only after careful necropsy study. Deaths from hemorrhage in the brain, gastro-intestinal tract and other sites have been reported in cases running a benign clinical course during anticoagulant therapy (2). It is also of some significance that many observers have been impressed with 1) the frequency of embolic phenomena, though the prothrombin time is within good therapeutic limits, and 2) the incidence of significant hemorrhage when the case is apparently under satisfactory control.

From the evidence, therefore, it appears difficult to justify the use of a procedure which, though rarely more than 50 to 60 per cent effective, is associated with danger of a degree approaching that for which its employment has been strongly recommended. Consideration must also be given to the probable results of anticoagulant therapy administered by busy practitioners or by specialists in smaller institutions, without the advantages of teamwork, and where laboratory facilities are often over-taxed, inadequate or substandard. One must not lose sight of the fact that most patients with acute myocardial infarction are treated by general practitioners and not by specialists in research hospitals, and that many patients are still being treated at home. In a survey made by us in 1953 by means of a questionnaire, 228 cardiologists and internists reported 122 deaths caused by hemorrhage from anticoagulants given in the treatment of acute myocardial infarction (2).

Notwithstanding this evidence, Wright (11) and Nichol and associates (12) challenge the validity of data derived from retrospective studies of hospital case records, contending that it is much more difficult to classify patients prognostically at the onset of an attack than in retrospect after their discharge from the hospital. Objection has also been raised to flexibility in therapy relative to our judgment of the severity and anatomy of the attack, on the grounds that one cannot always be certain as to what constitutes a small myocardial infarct, and that what starts as a mild attack may become severe a few hours later (13).

The feasibility and justification of such classification at the onset of the attack or early in its course in order to determine the need for anticoagulant therapy, however, have been clearly demonstrated in a recent study in which we observed the clinical course and outcome in an additional 122 cases classified as "good risk" and treated by conservative measures without anticoagulants (8). In this series, at the first examination on admission to hospital, anticoagulant therapy was intentionally withheld in each instance because of the absence of the poor

prognostic signs previously enumerated. The mortality rate for this group was 4.9 per cent, but careful analysis of the causes of death revealed that the preventable mortality under ideal anticoagulant therapy could not have exceeded 0.8 per cent. In the entire series, there was not a single instance of cerebral or of peripheral arterial embolism. Clinical thromboembolic phenomena were observed in only 4 patients—an incidence of 3.3 per cent. In 2 of these 4 patients, moreover, the diagnosis of this complication was only presumptive.

Similar observations and conclusions have been recorded in the literature by an increasing number of authors. All studies of selected "good-risk" cases of acute coronary occlusion published hitherto, including those of Wright *et al.*, clearly reveal that the death rate among such patients cannot be significantly altered by anticoagulants (6–8, 11, 14–16) (Table 2). It is of interest that even among those who participated in the anticoagulant study sponsored by the American Heart Association, there are those who believe that anticoagulant therapy confers no benefit in clinically mild cases of acute myocardial infarction.

Time of removal to hospital. The wide employment of anticoagulant drugs in acute coronary thrombosis has been associated with another risk, commonly overlooked. In order to institute treatment without delay, many patients are rushed to the hospital shortly after the onset of the clinical attack, despite the fact that the highest death rate in this disease prevails during the first forty-eight hours. Since these early deaths are the result of ventricular fibrillation, cardiac asystole, shock or congestive heart failure, and are unrelated to thromboembolism, they almost certainly cannot be prevented by anticoagulant drugs. The desire to save the small proportion of coronary patients who may die from thromboembolism after the first week may, therefore, jeopardize the chances for survival of the much larger proportion known to die from other causes during the first two days. For many patients, being jostled in an ambulance or admitting office, then subjected to the psychic trauma of a hospital room and bed, being placed in an oxygen tent (often when oxygen is entirely unnecessary) and being

TABLE 2

Mortality and Incidence of Thromboembolism in "Good-risk" or "Mild" Cases of Acute Myocardial Infarction

Investigators	No. of Cases	Mortality Rates (%)			Thromboembolism (%)
		Over-all	After 48 Hrs.	Theoretically Preventable*	
Russek and others (4, 6), 1951–52	489	3.1	1.2	1.0	0.8
Papp and Smith (14), 1951	69	0.0	0.0	0.0	0.0
Littmann (16), 1952	109	—	1.8	0.9	1.8
Furman and others (27), 1953	76	—	1.3	—	4.0
Committee on Anticoagulants (Wright *et al.*) (10), 1953	24	—	0.0	0.0	16.0
Russek and Zohman (8), 1954	122	4.9	2.5	0.8	3.3

* Percentage of deaths theoretically preventable if anticoagulants had been used.

repeatedly punctured for prothrombin and coagulation-time blood samples hardly constitutes optimum management during this early critical period. In most instances any form of treatment deemed necessary can be initiated in the patient's home and removal to a hospital can be accomplished, if indicated, when this critical period has passed.

Effect of age. It has been repeatedly claimed that old age constitutes a special indication for the use of anticoagulants in acute coronary occlusion. Wright (17) believes that, although the incidence of thromboembolism may be no greater in the aged than in the young, the older patient is more vulnerable and less likely to survive the consequences of thromboembolism. We have shown, however, that no justification exists for the concept that age is an important factor in determining the prognosis in the individual case (18, 19). Statistically, there is a higher incidence of serious attacks among older patients, and consequently a higher incidence of thromboembolism (Table 3). For this reason alone, anticoagulants exert a greater life-saving action in patients over 60 years old than in younger patients (1). It has not been recognized that the prognosis, in either a severe attack or a mild one, is uninfluenced by age. Our comparisons of cases of similar severity in different age groups demonstrate that the mortality rates are about the same, whether the patient be old or young (18–20) (Table 4). One must therefore conclude that the initial clinical appearance of the patient, irrespective of age, constitutes the best index to his future course and should be the deciding factor regarding the need for anticoagulants.

Possible additional life-saving actions. It has been suggested that anticoagulants may have additional life-saving actions beside that of preventing thromboembolism. Some have contended that these agents ward off congestive failure, ventricular fibrillation and asystole by preventing further clotting in the coronary lumen. Gilbert and Nalefski (21) have attributed the favorable results observed from the use of anticoagulant drugs in cases of acute myocardial infarction and

TABLE 3

Analysis of Cases of Acute Myocardial Infarction According to Age and Severity of Attack

	Total	"Good Risk"	"Poor Risk"
All ages	1,047	489 (46.7%)	558 (53.3%)
Under 60 years	618	331 (53.6%)	287 (46.4%)
60 years or over	429	158 (36.8%)	271 (63.2%)

TABLE 4

Mortality Rate in Cases of Acute Myocardial Infarction According to Age and Severity of Attack

	Total	"Good Risk"	"Poor Risk"
All ages	33.4%	3.1%	60.0%
Under 60 years	28.8%	3.0%	58.5%
60 years or over	40.1%	3.2%	61.6%

angina pectoris primarily to an increase in coronary blood flow. Graham and associates (22), on the other hand, in reporting pronounced relief of anginal symptoms in patients receiving periodic injections of heparin, ascribe the beneficial response to the profound effect of the drug on lipoprotein metabolism. Other studies with heparin, however, have failed to demonstrate either subjective improvement in anginal symptoms or favorable influence on the electrocardiographic response to standard exercise (23). The recent report of Gilchrist (24) offers a possible explanation for the unexpectedly large benefits reported from the use of anticoagulant drugs. This author observed that the early and efficient use of heparin and bishydroxycoumarin (Dicumarol) or ethyl biscoumacetate (Tromexan) appears to influence favorably the outcome of the shock syndrome. Deaths from the severer grades of shock were reported to have been reduced from 15 to 4 per cent as the result of therapy. Gilchrist suggests that the early employment of heparin in addition to the more slowly acting anticoagulants may limit the spread of multiple thrombotic extensions in and through the zone of demarcation separating the necrotic from the adjoining healthy muscle. Control of the thrombotic tendency may thus prevent an advance in the vicious cycle of thrombosis, infarction and hypotension. If these findings are confirmed, the current practice of administering Dicumarol or Tromexan alone without the immediate use of heparin must be viewed as falling far short of achieving optimum benefits from anticoagulant therapy in many cases.

Selection of cases. Among 1,318 patients in one of our recent studies, 611 (46 per cent) qualified as "good risks" (8). When the mild cases treated at home by conservative measures and the serious cases with specific contraindications to anticoagulant therapy are taken into account, probably not more than 30 per cent of all cases can be considered suitable for anticoagulant treatment. This low estimate should not detract, however, from the value of anticoagulants in properly selected patients, *i.e.*, those with poor prognostic signs. The administration of anticoagulants in such cases constitutes a major advance in the treatment of acute myocardial infarction.

Not all physicians share the view that anticoagulant therapy represents a forward step in the management of acute myocardial infarction. Evans (25) has stated that: "Anticoagulant therapy has failed to satisfy any of the three demands made by the code set to test its efficiency in coronary occlusion. . . . That anticoagulant therapy in coronary occlusion will go the way of other discarded remedies is certain. . . . Let it go now, before remorse weighs too heavily on those who may continue for a little longer to advocate its use." Evans claims that laboratory control is inadequate to prevent hemorrhage from the use of anticoagulants. It has been said that deaths from thromboembolism can be abolished by the use of ethyl biscoumacetate (Tromexan ethyl acetate), "but is death from hemorrhage, which is then to become the greater risk, to be favored because of a more tranquil end? It is rather ironical that pharmaceutical firms that supply a particular anticoagulant also provide their own brand of vitamin K so that Tromexan begets its Synkavite and Cumopyran its Hykinone. It causes us to think when the sale of a particular poison might be urged to boost the good offices of its corresponding antidote."

Some believe anticoagulant drugs are effective in preventing myocardial infarction when clinical symptoms indicate that the latter is impending. However, an analysis of 8 investigations into the incidence of thrombosis within the coronary artery circulation in patients with myocardial infarction examined at necropsy revealed an absence of such clotting in the coronary arteries in 57 per cent (25). Moreover, Master and associates (26) have found a strikingly low incidence of subsequent myocardial infarction in patients with premonitory signs and symptoms who were treated with bed rest and conservative management without the use of anticoagulants.

SUMMARY

The realization that the anticoagulant treatment of thromboembolic disorders is a controversial subject brings up the question for the general practitioner as to how to proceed with his treatment of acute coronary occlusion. From the evidence, anticoagulants, like other drugs, appear to be indicated only under certain well defined circumstances. If he is not familiar with the action of these drugs or does not have the necessary laboratory facilities, he would be wise to abstain from their administration. If, on the other hand, he feels competent to apply such therapy he must use it with discrimination, according to the condition of his patients. He may choose to follow those authorities who have a more aggressive attitude, or others with a more conservative approach. In either case he need no longer fear to act under the courage of his own convictions.

REFERENCES

1. Wright, I. S.; Marple, C. D., and Beck, D. F.: Report of the Committee for the Evaluation of Anticoagulants in the Treatment of Coronary Thrombosis with Myocardial Infarction, *Am. Heart J.* **35:** 801 (Dec.) 1948.
2. Russek, H. I., and Zohman, B. L.: Anticoagulant therapy in acute myocardial infarction: a survey of specialists' opinions regarding indications, results and dangers, *Am. J. M. Sc.* **225:** 9 (Jan.) 1953.
3. Friedberg, C. K.: Diseases of the Heart. Philadelphia, W. B. Saunders Co., 1949, p. 475.
4. Russek, H. I.; Zohman, B. L.; White, L. G., and Doerner, A. A.: Indications for bishydroxycoumarin (dicumarol) in acute myocardial infarction, *J. A. M. A.* **145:** 390 (Feb. 10) 1951.
5. Russek, H. I., and Zohman, B. L.: Prognosis in the "uncomplicated" first attack of acute myocardial infarction, *Am. J. M. Sc.* **224:** 496 (Nov.) 1952.
6. Russek, H. I.; Zohman, B. L.; Doerner, A. A., and Russek, A. S.: Indications for bishydroxycoumarin (dicumarol) in acute myocardial infarction, *Circulation* **5:** 707 (May) 1952.
7. Russek, H. I., and Zohman, B. L.: An evaluation of anticoagulant therapy in the treatment of acute myocardial infarction, *Am. Heart J.* **43:** 871 (June) 1952.
8. Russek, H. I., and Zohman, B. L.: Selection of patients for anticoagulant therapy in acute myocardial infarction, *Am. J. M. Sc.* **228:** 133 (Aug.) 1954.
9. Scarrone, L. A.; Beck, D. F., and Wright, I. S.: A comparative evaluation of tromexan and dicumarol in the treatment of thromboembolic conditions—based on experience with 514 patients, *Circulation* **6:** 489 (Oct.) 1952.
10. Wright, I. S.; Beck, D. F., and Marple, C. D.: Myocardial infarction and its treatment with anticoagulants, *Mod. Concepts Cardiovas. Dis.* **23:** 208 (Jan.) 1954.
11. Wright, I. S.: The pathogenesis and treatment of thrombosis (George E. Brown Memorial Lecture), *Circulation* **5:** 161 (Feb.) 1952.

12. Nichol, E. S.; Phillips, W. C., and Jenkins, V. E.: Anticoagulants in coronary heart disease, *M. Clin. North America* **38:** 399 (March) 1954.
13. Halpern, M. M., and others: The selective use of anticoagulants in acute myocardial infarction based on initial prognosis, *Ann. Int. Med.* **41:** 942 (Nov.) 1954.
14. Papp, C., and Smith, K. S.: Prognosis and treatment of cardiac infarction: survey of 200 patients, *Brit. M. J.* **1:** 1471 (June 30) 1951.
15. Baer, S.; Heine, W. I., and Krasnoff, S. O.: The mortality of acute myocardial infarction in private practice, *Am. J. M. Sc.* **222:** 500 (Nov.) 1951.
16. Littmann, D.: The prevention of thromboembolism in acute coronary-artery disease, *New England J. Med.* **247:** 205 (Aug. 7) 1952.
17. Wright, I. S.: Personal communications.
18. Russek, H. I., and Zohman, B. L.: Age and survival in cases of acute myocardial infarction, *J. A. M. A.* **147:** 1731 (Dec. 29) 1951.
19. Russek, H. I., and Zohman, B. L.: Chances for survival in acute myocardial infarction, *J. A. M. A.* **155:** 765 (Oct. 23) 1954.
20. Zohman, B. L., and Russek, H. I.: The present status of anticoagulant therapy in acute myocardial infarction, *Quart. Rev. Med.* **9:** 1 (Feb.) 1952.
21. Gilbert, N. C., and Nalefski, L. A.: The effect of heparin and dicumarol in increasing the coronary flow volume, *J. Lab. & Clin. Med.* **34:** 797 (June) 1949.
22. Graham, D. M., and others: Blood lipids and human atherosclerosis. II. The influence of heparin upon lipoprotein metabolism, *Circulation* **4:** 666 (Nov.) 1951.
23. Russek, H. I.; Urbach, K. F., and Doerner, A. A.: Effect of heparin in cases of coronary insufficiency, *J. A. M. A.* **149:** 1008 (July 12) 1952.
24. Gilchrist, A. R.: Coronary thrombosis and its response to treatment, *Brit. M. J.* **2:** 351 (Aug. 16) 1952.
25. Evans, W.: Anticoagulant therapy in coronary occlusion, *Proc. Roy. Soc. Med.* **47:** 318 (May) 1954.
26. Master, A. M.: Personal communications.
27. Furman, R. H., and others: An evaluation of anticoagulant therapy in myocardial infarction based on prognostic categories, *Am. J. Med.* **14:** 681 (June) 1953.

MEDICAL AND VOCATIONAL COOPERATION FOR THE AGING

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Inhabitants of the United States have been able to enjoy an increased life span to an average expectancy of about 70 years—the biblical three score and ten, with many millions living well beyond this age. The prospect of a 100-year lifetime is not improbable. Even now, 1 person in 55,000 lives to be 100.

With the increased opportunities for longer living there are increased problems for the senior citizen. At present, approximately 15,000,000 men and women in this country are 65 years of age and over. By 1970 there will be about 21,000,000 such people. This represents a fairly large segment of our population. Even though great strides are now being made in the entire field of the aging, much more can, and should be accomplished. Our culture is a work culture. The percentage of people aged 65 and over who might be given work has doubled in the last fifty years; yet the proportion of gainfully employed in this group has decreased from 68 per cent in 1890 to 42 per cent in 1950. Figures for 1955 indicate that the percentage of those gainfully employed who are aged 65 is still decreasing instead of increasing. Women from 35 to 40 are considered old in the labor market and men 40 years of age or older are finding it extremely difficult to secure a job.

Middle-aged and older workers who lose their jobs have trouble finding new ones. This is true even in times of full employment. Charles E. Odell, Special Assistant to the Under-Secretary of Labor, pointed out in November 1954 that there were 816,000 workers over 45 years of age in the active files of the Public Employment Service (1). Although they constituted almost 29 per cent of all active candidates looking for jobs, they received only 17 per cent of the placements made by the Employment Service during that month. This is particularly significant when one realizes that the population aged 45 and over has been increasing more rapidly than the total population. In 1950 there were 42.5 million people aged 45 and over. Indications are that there will be approximately 64 million people of this age by 1975. Examining these figures further we see that from 1900 to 1950 the general population had increased 98 per cent, but the number of people aged 65 and over had increased 297 per cent, the number of people aged 55 to 64 had increased 230 per cent, and the number of people aged 45 to 54 had increased 170 per cent. It is obvious that, in order to keep pace with present trends in our aging population and in our labor force participation, we shall have to absorb at least 10 million workers who are 45 or over by 1975. The problems involved are enormous ones, but they are problems that can be met with critical thinking, planning and execution.

This article is a presentation of what we believe should be accomplished in the combined medical-vocational field for the aging. We believe that greater cooperation is required between the physician and the vocational counselor. The team

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approach as it is too often constituted, with case discussion over the telephone or brief letters of referral, is not sufficient. The terminologies used by the physician and the vocational counselor can be brought much closer together for the common good of the patient. There are obviously many problems that need to be considered in helping the aging; sometimes the problem is recreational, occasionally it involves housing or, frequently, medical care. We are limiting our project to an area in which the doctor and the vocational counselor or counseling psychologist can work. With Public Law 565 and the new rehabilitation counseling program in many universities, this is an excellent time to determine what action and terminology must be developed so that all professional people may work together. In some of the courses now given in the training of rehabilitation counselors, the use of physicians as lecturers may well be included for better understanding of mutual problems.

Several private agencies, as part of the training of rehabilitation counselors, see that they work most closely with physicians in their counseling and placement activities. An interesting pioneer project is that of the inter-professional educational program at Western Reserve University. In this university medical school, there is an inter-professional rehabilitation teaching team. It is composed of instructors from medicine, nursing, social work, physical therapy and vocational guidence, who assist preceptors in seminars with third-year and fourth-year medical students. Here we see the physician not only being educated in "the role of vocational guidance in rehabilitation," but allied professional groups become aware of the relationships of guidance to their specific specialties. This method helps the professional team to gain a better understanding of available resources in the community.

THE GOVERNOR'S SEVEN-MAN COUNCIL

In Massachusetts a significant step forward has been accomplished since the Governor's Seven-Man Council on the "Employment of the Aging" was incorporated in 1954. The junior author of this article serves as chairman. The council is trying to realize the following objectives:

1. Research and education to develop a program to eliminate age as a barrier to employment.
2. A program to encourage employers to hire the aging.
3. A list of jobs to be compiled for industry for which aging persons have been found particularly suitable.
4. Studies on the utilization of aging manpower in industry.
5. A sound program for expanding the work of the aging at home and in sheltered workshops.
6. A sound program in rehabilitation and training of the aging.
7. A sound program for the community employment of the aging.
8. Preparation for retirement.
9. Legislation that will help the employment of the aging.

In the work of this council more help should be sought from physicians interested and trained in medical as well as vocational rehabilitation, so that they can add

their medical knowledge to the prevention and treatment of the physical and mental conditions which interfere with the employment of the aging.

REHABILITATION OF THE AGING

The commoner disabilities which handicap older people include those of the heart, the peripheral and cerebral blood vessels, the nervous system or the skeletal system. Immediate treatment by the internist is the primary concern. Shortly after this, depending upon the report of the internist, medical rehabilitation is started, to help in restoration of the involved parts of the body.

Rehabilitation for conditioning—whether it be after operation on a fractured limb, for osteoarthritis, or for generalized muscular aches or weaknesses—involves the use of moderate dosages of various types of heat, some massage, and some mild form of assistive, active, and even resistive exercises. The resistive (2) exercises are of the non-weight bearing type, requiring lifting of a moderate weight with a moderate number of repetitions, to the point of discomfort in that part of the body musculature which needs to be activated. The following is an example of the course of such exercising in a 62-year-old man sent to the Physical Therapy Section by the referring doctor, who wrote:

> "A thin, elderly male desires to do some exercising. He is a chronically ill patient who is debilitated. Physical and occupational therapy may offer some help. No strenuous type of activity is possible."

It was thought, since no other type of exertion would be suitable, that non-weight bearing exercises starting with the quadriceps muscles of his thigh would help to build up an important segment of his musculature. This was carried out as a regimen of moderately repeated, moderate weight bearing, to avoid any unusual strain on his muscles, joints or circulatory system. The starting lift was 7 pounds (in the form of a weighted boot), which represented what the thigh muscles of one leg were able to lift comfortably, once. Then a series of lifts was started with two-thirds of this load—5 pounds. This 5-pound weighted boot was lifted 16 times; then there was a rest period of about two minutes; then eighteen lifts; then a rest period; and finally 16 more lifts. Thus the patient was able to elevate the 5 pounds 16–18–16 times as his individual tolerance. After four weeks, with a gradual increase of weight every seven to ten days, the 62-year-old patient who had been described as chronically ill and debilitated was lifting according to the following schedule: 20 pounds 18 times; a few minutes' rest; 20 pounds 15 times; another rest; and a final lift of 20 pounds 16 times. We wish to stress the point that (since human beings may vary from day to day in their ability to do some types of physical work) this patient as well as others was permitted to decide the weight of the load and the number of times he would lift that load during each treatment period.

Two hemiplegic patients were also treated by resistive exercises to the threshold of tolerance. At the first session the muscles of their involved lower extremities were able to lift 2 pounds about 10 times. Seven weeks later they could lift 10 pounds 10 times.

Attention to posture, good care of the feet, an amount of walking consistent with general strength, sufficient rest, and instruction in progressive relaxation are important factors.

Attention to the psychosocial needs of the aged individual must not be neglected.

Case Histories

Two case histories illustrate some of the information usually sought from the vocational counselor and the medical man. These cases do not represent our idea of the close working relationship that should exist between the counselor and physician, but they are better than average.

Case 1

C.S., a 50-year-old man was referred to the counselor for vocational planning and job placement. A letter from the physician explained that removal of a cerebral tumor had left this patient in a weakened and disfigured condition. According to the doctor's prognosis, it would be twelve to eighteen months before C.S. could consider any sort of work but, since the patient insisted, he was given an early referral to the counselor. The doctor recommended very light work requiring little walking about, and a minimum of traveling to and from the job.

C.S. walked into the counselor's office unsteadily. His left foot dragged slightly, one shoulder was slumped far below the level of the other and the lower part of his face was twisted to the right. Over his glasses he wore a plastic cup which completely covered his left eye. His left hand was noticeably limp. He spoke with a strong nasal twang.

The patient was eager to cooperate and explained his background readily. Since being graduated from high school in Boston, he had been a house painter, self-employed for the previous twenty years. Generally, he made a steady income without ever being able to accumulate much in the way of savings. His first wife had passed away ten years before. They had no children. About four years later, he married his present wife, a widow with two married children. The next six years were marked by three separate attacks of lead poisoning caused by the absorption of lead from paints. After the third attack, his doctor ordered him to stop using lead-base paints and concentrate more on house papering, which he did.

Following a diagnosis of brain tumor, a surgical operation was performed successfully. However, during the course of the operation certain nerves, mostly facial, were damaged. In an attempt at repair, neural grafts were taken from a shoulder to replace the damaged facial nerves. Temporarily damaged, too, was the tear gland of the left eye; this condition necessitated the wearing of a nearly air-tight cap around the eye in order to prevent desiccation and consequent blindness. A return to his former occupation, painting, was out of the question.

During the three months of convalescence, the emotional and financial situation at home steadily deteriorated. The little savings he had were soon spent. His wife, an extremely dependent person, could not make herself go out to work, since she had never really worked before. The children, in turn, were angered that their step-father could not support their mother.

C.S. realized his potentials in the general job market. When a plan was presented to him, by means of which he could learn furniture finishing and progress at his own pace with a small salary, he immediately agreed to it. Plans were made with a sheltered workshop to have him accept a job in the furniture finishing department at a starting rate of 40 cents an hour while learning. After an interview he was ready to start work.

Shortly afterward, he reappeared for vocational counseling. He explained there were

many handicapped people at the workshop who made the environment too depressing for him. He felt he could not work in such a situation. Further discussion revealed that, psychologically, he saw himself when he looked at the other handicapped workers around him. It was too difficult for him to accept the idea of his own handicap.

Up to this point the length of contact between the patient and the counselor had extended over a period of four to five months. During this period he had been seeing his physician, and his appearance had improved considerably. He walked more steadily with both shoulders carried at almost the same level. Facial features were improved by plastic surgery. He was more employable in terms of physical appearance and strength, but the same restrictions on his working conditions had to apply: light work, little walking, and not much traveling to and from the job. The counselor got in touch with many employers before a suitable opening was found. A position at $45.00 a week to manage a small sandwich and soft-drink concession was secured. This job consisted mainly of selling ready-made sandwiches and soft drinks, which could be done while sitting down.

A follow-up inquiry was made some time later. His home life had become more harmonious and he had received an increase in salary from the employer, who was well satisfied with his work.

At the time of his last contact, the extent of C.S.'s physical and emotional improvement was remarkable. With the use of counseling techniques the client was able to achieve more insight into his problems, to lower his aspirations, and to gain a more realistic picture of his potentialities. He had been rehabilitated medically to a high level. The possibility of a marital break-up was averted by referral to an appropriate agency. With a job in hand, self-respect restored, physically and mentally reconditioned, and his family life on a more harmonious level, his present and future seemed considerably brighter.

In the foregoing case there was need for considerable vocational counseling besides surgery. A few additional efforts in physical and mental rehabilitation were required before his conditioning was good enough to cope with the job selected.

In the second case more medical rehabilitation was required than vocational counseling.

Case 2

S.R. was a retired storekeeper, 78 years old. After an automobile accident, he was hospitalized for multiple fractures of the pelvis and right leg. In about two weeks' time, the main treatment problem concerned some recently developed ulcers of the sacrum and heel. An overhead crane operated by a hydraulic lift was secured, and appropriate use of this apparatus helped prevent further ulceration of the back and heels; the ulcers that were present began to improve slowly. In about three months with help from specialists in orthopedics, medicine, dermatology and plastic surgery, and continued use of the hydraulic lift, the decubitus ulcers cleared up completely without the extensive skin grafting operations which had been contemplated.

After discharge, despite the serious fractures that had been followed by ulcerations of the back and heels, and complications such as anemia, edema of legs and a heart murmur, the patient was able to cook his meals, care for himself, walk around to do light work in the house, and care for an oil heater for two apartments. He is now able to sweep and, when necessary, shovel snow. He does not lie in bed during the day, he eats well, attends meetings when an automobile ride is available, is mentally alert, and requires no medication to sleep at night.

Physical medicine procedures included bed exercises for the strengthening of the upper extremities, attention to posture, early elevation and supported ambulation, as well as some ultraviolet irradiation to the ulcerated areas on the back and heels.

He had, and still has several pathologic conditions, but is not really sick. He had, and still has many serious *disabilities*, but is not seriously *handicapped*.

This patient required much more medical rehabilitation than the first, with some help by advice and suggestions from the vocational counselor. The physiatrist and vocational counselor agreed that, during early convalescence, a certain type of activity might be suitable for the patient to carry out at home, since he was too old and handicapped to do anything requiring more than self-care at that time. However, more work was added on later, including the lighter tasks involved in the care of a two-family house.

COMMENTS

Research has shown that the aging worker in good health, when given a job for which he has abilities, interests, health and personality, is loyal and attentive to his work. Jobs vary in their physical demands, as do people in their abilities and skills. We must be aware that even aging is individualistic. There are as many differences among the aging as there are among our younger population. The physical and mental capabilities at a particular chronologic age are, therefore, an individual matter. Our concepts of older people should be based more on age-range than on the specific birth date. This is important, since men and women beyond certain ages are especially handicapped in their search for gainful work. People who do the counseling and placement know that men over 40 and women over 35 find it extremely difficult, once they lose a job, to obtain another. Not only do aging people have difficulty in gaining another job once the old one has been lost, but many of the compulsory retirement regulations take their greatest toll among the elderly who still are capable of many years of productive and efficient "work-life." Actually, aged employees long in service should, by transfer and training, be permitted to continue working.

We realize that the physician and the vocational counselor are only two of the many needed on a team for rehabilitation. We are not unmindful of the very important work being done by the general practitioner, the social worker, the clinical psychologist, the psychiatrist, and the public and private agencies concerned with the problem of the aging.

SUGGESTIONS

On the basis of our observations, we suggest:

1. Closer active cooperation between the physician and the vocational counselor by improvement in the understanding of each other's assets and limitations. These disciplines can merge to help the person who is capable and willing to work but is unable to obtain gainful employment. The vocational counselor carries this task as one of his professional responsibilities. The physician, with his medical knowledge, can do a great deal more than at present to help in the accomplishment of the medical geriatric rehabilitation needed in persons with disabilities which interfere with satisfactory selective employment.

2. Further refinement of methods of selecting, counseling and placement of the

aging. In placement, the counselor should improve his understanding of the pathologic conditions involved in the medical diagnosis, as well as the reasons necessary for a medically guarded prognosis.

3. The use of all community resources. A special pamphlet published by the "Boston Employ the Physically Handicapped Committee," detailing the facilities for treatment and placement of the handicapped, was sent to all physicians in the community. This mailing increased the number of referrals for jobs from physicians. Many doctors were unaware of most of the available facilities for the handicapped and the aging. When their active support was secured, it proved to be the needed factor which brought about an increase in job placements. Many of the new projects planned by the Department of Labor, particularly as outlined in their "Job Guide for Older Workers," are extremely helpful. These publications can be used both locally and nationally to bring about the results just described.

4. Support by physicians and counselors to consideration of a shorter work-day for the elderly. In this way the older person may adjust to a job that, without such shortened hours, he would be unable to perform.

5. A much more active role for the physician in the area of sheltered workshops and job-adjustment centers. Too often an initial physical examination is given prior to entrance into the center, but from then on the physician is consulted only when some emergency medical care is needed. Many counselors still fail to understand some of the medical explanations involved in the approval or rejection of an applicant for a specific job, since too many medical referrals do not take into account all the factors involved in the particular type of work.

6. A more extended use of the psychiatrist and the counseling psychologist, employing group methods of helping the aging. Research has indicated the value of group counseling as a supplement or complement to individual vocational counseling. It is extremely important that the results of complete, detailed testing of the physical and mental capabilities of these elderly job applicants be known prior to the group sessions.

7. More training of the aged for job placements. Retirement scholarships, such as those given by Boston University and other universities, as well as many described in "Scholarships, Fellowships and Loans" (3), can open up new job vistas for our aging population. Both the counselor and the physician should lend their support to the growth of these programs.

8. More frequent meeting of the physician and the vocational counselor in professional organizations that serve common interests. From the experience of the writers, this development in national and state organizations has tremendous possibilities. It should be stimulated and encouraged. A good example of cooperation in thinking and doing by both physicians and the vocational counselors is demonstrated on the national level in the National Rehabilitation Association.

9. Development of an area in which the older worker can be helped in part-time and full-time small business programs. For full-time business programs considerable care must be taken regarding complete physical check-ups prior, during, and after a plan has gone into operation. One can proceed with a calculated risk

only if it is based on adequate medical information. The doctor and the counselor can join in this task with insight into one another's disciplines.

10. The need of "retirement" counseling. This is a new area that has opened up untold possibilities for the vocational counselor and the physician. For such a purpose the counselor increasingly requires medical information which can help him secure the type of retirement that is satisfying both to the older person concerned and the community.

CONCLUSIONS

Ten guideposts have been suggested as areas for study in the further cooperation of medical and vocational rehabilitation for our aging population.

The accomplishments of the medical and vocational rehabilitation services will play an increasingly important role in the return of the aged patient to a satisfactory job and social adjustment in the community.

REFERENCES

1. Odell, C. E.: Medical and Social Problems of the Aging and the Aged. Employment and Employability. Address delivered at the Eighth Annual Meeting of the Gerontological Society, Sheraton-Belvedere Hotel, Baltimore, Maryland, October 27, 1955.
2. Rudd, J. L.: Resistance exercises in private practice, *Arch. Phys. Med. & Rehabil.* **36**: 775 (Dec.) 1955.
3. Feingold, S. N.: Scholarships, Fellowships and Loans. Cambridge, Massachusetts, Bellman Publishing Company, 1949, vol. 1, pp. 254; 1951, vol. 2, pp. 312; 1955, vol. 3, pp. 471.

GERIATRIC REHABILITATION*

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I. INTRODUCTION

With the expediting of principles relating to Geriatric Rehabilitation, one must doff the scientific hat to Howard Rusk. He has become a modern re-incarnation of Sir Francis Bacon. It was he, indeed, who "rang the bell that called the wits together."

In our great rehabilitation centers, be they the numerous University Hospitals or the "name Clinics" such as Mayo, Lahey or Ford, there is created a saturation point in partially repaired human beings, short of discharge.

There comes the day, when the fearful and the halt must leave the institution and continue their rehabilitation at home.

At this point, I must rely upon the metaphor of the bergamot plant. You recall that it occasionally sends a bold shoot from the center of the flower, bearing a bud that eventually unfolds. That is what the geriatric rehabilitant must do—he must bloom again.

The friends and relatives of this half-repaired creature must forever eradicate the false notion from their brains that they are dealing with a second-class citizen. At once the motto should materialize: "Here is a *first class citizen, who is but temporarily disengaged.*"

II. THE HOME PHYSICIAN

Sometime, after discharge and before the passage of a millenium, an essay must be composed by the rehabilitation hospital concerning initial procedures and forwarded to the doctor on the firing line.

This message need not be filled with smoke-screen trivia, but must boldly hew to some verities for immediate reference and future guidance.

From past experiences, I would suggest an outline as follows:

(a) A working diagnosis is greatly desired. Such words as "guarded" and "undetermined" do not sound as though the master might be speaking.

(b) There should be some reasonable medical exploration of thought that might support the diagnosis.

(c) What instructions were given to the patient on discharge?

(d) What prescriptions did the hospital pharmacy pour into the patient's lap? Were these bottles properly labeled, indicating the actual drug content within? Were such out-moded expressions as "Take as directed" given new birth to

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plague both patient and home physician? (If "Nervous-Nellie" labels confuse the patient, don't think for a moment that they will enlighten the attending man.)

(e) What were the *specific instructions* from the master-minded clinic to the doctor in the home field?

It is sad to relate that delay in providing information becomes a disservice to the continuation of proper therapy. It is sadder to record that the total absence of a letter of instructions plays havoc with all medical efforts. To tease the elasticity of faith still further, a poorly written theme, of C-minus quality, had better repose in the dead-letter office than arrive in the mail to exasperate frayed wits.

III. HOME BASE

Now comes the evaluation of Home Base for the partially rehabilitated. Shall the leash be 25,000 miles long with all the world to rove in, including visits to spas? Are there limitations to the county, the township, the town? Is just the immediate neighborhood permissible for roaming? There are some who can endure only house and yard. Others will be satisfied to settle for bed, bath and commode. Some can manage bed and wheel chair. Finally comes the group involving bed patients only.

IV. REGULAR FOLLOW-UP

The physician who attempts to carry on the procedures of rehabilitation must inspire the patient both physically and spiritually. The fatherly statement "If you need me, call me," never fills the bill in the way that aggressive instructions and follow-up will do. When the doctor's face is eternally absent, a new gloom settles in the sick-room. "He's too busy," is the answer. Too busy with what? He deals not with dogs and cats and horses but with human beings. The one soul under discussion belongs to that latter category. To be pompous, to be hurried, to be detached, gain no notes of response. If one cannot heal, then he must, at least, inspire. Here are some modified Ruskisms to tuck within our philosophy: "It is still worth while to recover."

"If I cannot restore the organ, then I will restore the man."

"Do not mourn for that which is lost, but rejoice for that which is left, and live and work with it."

"Avoid the fiddle-faddle of inconsequence."

"Learn to thrive on short clover."

V. PATIENTS' NEEDS

The half-healed victim requires certain bodily and spiritual aids that are evident from the first moment of care. Besides cleanliness of teeth, body and feet, and the usual amenities of civilization, there arises the well-worn problem of *constipation*.

Most patients, partly rehabilitated, can permit their intestinal tracts to profit from the following formula of fruit compote:

½-pound dried apricots
½-pound dried prunes
½-pound dried figs
½-pound raisins

Soak over night in water, in the proportion of pound for pint, resulting in a mixture of two pounds of fruit in two pints of water. In the morning, bring to a boil. Immediately, turn down the burner to simmer for an hour. This produces plumpish and appetizing whole fruit. Cool and place in refrigerator. Each morning serve a liberal bowl of compote, covered with fresh fruit juice, varying each day for flavor change.

Just before breakfast, insert a glycerine rectal suppository. Just after breakfast, expect a bowel movement. If none occurs, offer a pint of warm tap-water enema, with the patient on left side. Eventually, a regular after-breakfast bowel movement is attained, and later the compote need be served only twice a week.

At this stage, it is high time that a *religious comforter* make his regular appearances, be he rabbi, priest, preacher or Christian-science practitioner. No physician in his right mind would exclude those who preach hope and who have a broad philosophy of life. Dogma may be left with a baby sitter in the parking lot. I have had no problems with the Christian scientists. Once the healing process sets in and the level of expectancy is outlined, there is the same philosophical positivity expressed in other faiths.

The matter of *diet* deserves more than passing interest. It has been shown on numerous occasions that old folks, under stress, have a 25 per cent deficiency in proper food intake. Proteins and iron-bearing foods are on the dodge-list. A legitimate tonic with vitamin content is always permissible for both physical and psychic stimuli.

I have a favorite "pep pill" that I offer the old folks twice a week, which improves the appetite and aids the consumption of 75 to 90 grams of protein a day. It is made as follows:

Place a scoop of steamed spinach or other green vegetable upon a goodly slab of partially broiled liver. Hollow the spinach to hold a dropped-in raw egg. Sprinkle over the top some Parmesan cheese and lay on two rashers of partially cooked bacon. Place this concoction under the broiler and cook till the egg has jelled. By this time the other ingredients are done to a nice turn.

I once had an old lady serve this type of tonic to an entire assemblage of rehabilitated geriatric guests.

VI. ESTABLISHED ROUTINES

As the schedules become established, routines of care must of necessity follow logically. There are occasions for toilet, moments of exercise and massage, time for bath, rest, wheel chair rides through the garden and, later, occupational therapy.

The patients' complaints must be listened to and some degree of alleviation obtained. The patient who suffers from perseveration may even break his sad routine and offer a new thought. If so, take him up on it.

The routine of the day must be sound but not deadly. A few moments of diversion always stimulate interest; for example, the new baby next door, newly hatched chicks, the pups in the kennel, the shelf of African violets, the artistic endeavors of some member of the familly and the mutually created endeavors in some neighborhood work shop.

VII. ACCIDENT PREVENTION

The base board should be fitted with a wee night lamp for proper guidance to the bath room.

All scatter rugs should be removed. Let us not add a broken hip to the present calamity. Grandpa plus slide equals disaster.

Non-skid rubber mats, bearing mild corrugations, should pave the passage ways. All steps should be removed, ramped, or conquered with hand rails or parallel bars plus firm treads.

Strong hand bars must be installed over the bath tub. Better yet, a rubber-tabbed chair can be placed in the tub or shower. Whenever possible, avoid the sponge bath and let the patient shower himself. (A fixed hot-water thermostat will prevent scalding.) Such mild activities, if at all permissible, will prevent staleness of mind and body, to say nothing of decubital ulcers.

Relatives should be asked to deposit their favorite gadgets in the nearest gravel pit. Good progress may be delayed or exploded by some fast-talking, gadget-minded relative, bringing all gain to a standstill. I am thinking of such things as electric belts and misinformation about ultra-violet and infra-red lamps, to say nothing of vibrators. A loud and thumping vibrator over the heart of a coronary patient is not appreciated nor is the tachycardia quickly controlled.

The toys of the grandchildren function as death traps. Grandma on a false leg takes a ride to her doom on a loose roller skate. Let the children bring in their smiles and their kisses but keep their toys beyond the possibility of geriatric trip-ups.

The same advice pertains to sloppy housekeeping. When piles of unused materials begin to show and when articles are disposed of by tossing them into the corners, it is time to fire the housekeeper. If an enfeebled person steps out of bed onto a blob of splashed water, a tossed cloth, a dirty tray, or loose dishes slippery from recent egg and syrup, that is a pure sign of criminal negligence.

Rubbish must be disposed of in regular and orderly fashion. In a sick room I once witnessed a hurried and worried daughter pile up clean diapers, dirty diapers, groceries and rolled garbage into a foul and stinking pile. This leaning tower of Pisa awaited the first breeze or fickle whim of gravity to topple disaster onto an enfeebled ancestress.

I try to *avoid all barbiturates*. They tend to make the patient stiff of limb and contrary of mind. There is also the possibility of deterioration of character. A warm drink and reassurance are good assets. A mild pain reliever, combined with codeine or a tranquillizer, offers comfort occasionally. There is nothing better than lying down and simply going to sleep after a fruitful day.

VIII. EDUCATION

Years ago, my father attempted to prove that you *can teach an old dog new tricks*. His subject was a 14-year-old mongrel. The educational period lasted only seven days, but the eager old canine chalked up a repertory of six well-established stunts in that short time.

In like manner, these geriatric and partially incapacitated people may be educated along many lines, beyond the mere demands of physical rehabilitation. While the body is being taught to mend and to establish newer and different methods of self-care, the mind and the crafts can also be re-associated. I have observed a one-armed accountant painfully learn to write and figure with his left hand; but better still, he assumed newer powers of mental arithmetic and arrived at conclusions in faster time than did his competitors. He finally was dubbed the "human adding-machine."

Grandma Moses has been reincarnated so many times that I hesitate to bruise her further. Just the same, in my practice I am caring for a hemiplegic woman, who has learned to paint with her left hand. The first proud nautical scene hangs above her fireplace for all to see and admire. Even I can differentiate, without confusion, the separate identities of water and ships! Daily victories must be won. An intensity of accomplishment produces the after-glow. The gladiator fights with a paint brush!

In the Appendix are listed many variations on this theme, extending to other fields.

IX. PERSONAL APPEARANCE

Nothing is so depleting as the reflected view in the mirror of a haggard old man or the hag-view of a woman. Doll up grandma and urge the elderly male to shave and put on clean clothes. When orderly appearance becomes an expected routine, there is better opportunity for other features of personal hygiene to gain attention.

Self care and the *control of toilet needs* become the concrete foundation of all geriatric rehabilitation. It is useless to discuss prosthetics without emphasizing esthetics. Here enters Dr. Bortz's concept of human husbandry. Here is the key stone in the arch of psychic rehabilitation. If we are denied a whole man, let us settle for a partial man, but let him be sanitary. Freshness from without will inculcate freshness from within.

X. PRACTICAL APPLICATIONS

The previous discussion indicates the pace, generally. The following are some practical suggestions in the post-diagnostic and therapeutic fields:

A. *The hemiplegic*

Many of these patients never reach the rehabilitation centers but are cared for at home by relatives or friends. Such care may be of the so-called occasional and drop-in variety and is, therefore, dangerous. There is no consistency to its quality and no persistency to its drive. The physician must lay down the law of human care, to avoid hopelessness in the attempt to escape from calamity.

Let us assume that a proper course of hypotensive drugs has been instituted and that thundering orders have been given regarding care of the bowels, bladder and skin.

To describe a hemiplegic patient, one must conjure the thought of a so-called

healthy person who suffers a headache of unusual intensity and suddenly becomes helpless in one leg and arm, with or without unconsciousness and with or without facial distortion.

The affected upper extremity is apt to be found in adduction and internal rotation, with flexion of elbow, wrist and fingers. The lower extremity may be merely weakened or may demonstrate complete helplessness with flexion and abduction at the hip joint. The knee may be flexed partially. The ankle is, on occasion, found to be plantar flexed, with some degree of supination. Rusk recommends a posterior ankle splint to prevent shortening of heel cord. He places a pillow in the axilla to prevent abduction and internal rotation of the shoulder. Passive movements are started early, including abduction, external rotation and overhead position. These movements are repeated several times a day to prevent "frozen shoulder." Rusk deplores this shoulder deformity and the shortened heel cord.

If the relatives are ignorant people, they can at least be trained in full-range passive motion and mild stretching, to say nothing of infra-red bakes, warm magnesium sulphate (Epsom salt) fomentations and mild massage. In a simple home of lowly folk, I have obtained excellent results merely because the attendant and the victim never gave up and insisted upon improving the residual disabilities.

When walking begins, one can employ Rusk's double-bar short leg brace with a stump attachment. The patient is less apt to suffer fear in flexing the knee and hip with such an arrangement. Walking begins by moving the right arm and left leg forward; then the left arm and right leg. The affected arm should not be allowed to hang motionless. Parallel bars soon enter into the picture. The helpless hand may be attached to a sliding ferrule, to ease the glide and prevent excoriation. Progress and prognosis vary with the original lesion and the co-operation of the patient.

Right hemiplegia in a right-handed person demands newer skills and further education for the left hand. Although difficult, it can be done.

As soon as muscle tone is partially established, muscles must be re-educated to begin actively what has been accomplished passively. Rotate the shoulder, flex the arm, pronate and supinate the hand, rotate the arm internally and externally and extend the fingers.

Victory is declared for such small accomplishments as the first lifting of a piece of bread to the mouth, though they fall far short of final expectations. A handy rocking fork with a knife edge becomes a universal feeder.

As soon as possible the patient makes his way to the commode or the bathroom toilet. A wheel chair with a disappearing toilet vent may be wheeled directly over the toilet seat; soon the patient can strong-arm himself onto the seat itself. There are long plastic handles holding proper wads to perform personal cleansing, to be followed by damp application, if desired.

There are many one-armed devices that aid in self-assistance, such as the one-handed typewriter keyboard, one-handed telephone aid, and the one-handed wheel-chair drive with removable arm rest.

Speech therapy may require a specialist in the field. However, most patients

can partially recover their verbal ability with the aid of family and physician, beginning with word-naming episodes of life, and progressing to expressions describing everyday situations.

A close member of my own family remained unconscious for weeks, yet finally learned to walk again, to talk after a fashion, and to play the piano with much resounding vigor, albeit there were a few limps in the Sextet from Lucia.

One must hope for enough improvement in four to five months to predict eventual levels of rebuilding. Deformities should be prevented, but when they occur, proper treatment should be carried out.

B. *The paraplegic*

My experience with paraplegic patients begins where the rehabilitation center has left off. A typical case is the elderly man with a traumatized spinal cord or some other pathologic condition. He is apt to be a wheel-chair and bed invalid. However, the folding chair permits rides in the car. He must be trained to manipulate himself to the toilet, to his bed and to the bath.

There is gross weakness in the lower limbs, which may demonstrate some spasticity. The legs may be flabby and atrophic, or somewhat stiff and heavy. As the disease progresses, the tendon and plantar reflexes become diminished or disappear. The patient may subjectively suffer from burning, tingling or coldness. There is generalized wasting. Jerky movements of the ankles may produce traumatic and slow-healing ulcers over the tendo-Achilles.

The bladder problem assumes an important position in family care. Condom-catheter drainage is an ever-present aid, but urinary infections must be guarded against. There is some slight hope of bladder training. The gloved finger titillation may start the morning bowel function. An occasional enema and the employment of the fruit compote (*see* Section V) are legitimate aids.

The family physician becomes a giant of strength. He must buoy morale, watch the general nutrition with critical eye and think in broad terms of general health. The patient must be severed from his bed by his own power or by the power of the hovering attendant.

As much rehabilitation as the traffic will bear should be insisted upon and followed up, as here is where hope beyond vanity, courage and audacity enters the picture and blots out the element of retreat.

A high-protein diet and good care of the skin are important factors in the background of constructive morale. If a decubital ulcer develops, simple warm compresses, mild infra-red therapy and a powder-puff are of assistance. Far advanced cases may require skin graft.

Active motion of the entire mobile portion of the body must be indulged in daily. Passive motion of all flaccid members, plus heat (wet and dry) and massage are daily "musts." The patient sets a standard to manipulate himself from chair to bed and back to the chair; from chair to toilet and back to the chair; from chair to tub-seat or shower-seat and back to the chair. Later, by means of push-up exercises, he may so strengthen his shoulder muscles that he may push himself to the car, enter, and with hand controls and hand brakes, succeed in

driving with safety. He becomes adept at buttons, snaps and zippers. Pre-tied elastic shoe laces are a gift of modern invention.

Economic and social disasters must be overcome. Relatives and close family members must not yield to discouragements. The family physician, the psychiatrist, the physio-therapist, and the visiting nurse should rehearse in advance to secure a united, positive front.

Educational adventures for the mentally alert may progress well past the point of self-care. Walking with braces may be accomplished. Such extension courses as illustrative art and accounting can fill the spare moments of the day. In my practice, there is a paraplegic patient who earns a partial living in creative advertising art. An elderly professional man has now become a book-keeper and wheels himself to his desk quietly and efficiently.

One must avoid a return to infancy and dependency. Accomplishments become majestic in scope. A vegetative existence with deterioration in mental outlook can be obviated by physical and psychic exercises that bear economic fruit. The patient can become more self-reliant as his productivity mounts. His irascible moods are replaced by those of moderation and relaxation. He undergoes a second maturation in his older years.

C. *The amputee*

In discussing the amputee, I shall confine my remarks to those geriatric patients who are not mentally afflicted. There must exist an urge to improve and an ability to be taught the logistics of the battles of rehabilitation.

Whether the amputation resulted from trauma, arteriosclerosis, Raynaud's disease, diabetic gangrene or Buerger's disease, the principles of self-care and the conquering of handicaps remain within the close confines of related solutions.

We hope to inherit from the surgical service a patient with *well-healed stump* and *without flexion deformity*. I can well recall a man 77 years of age who was sent home from his surgeon with a palliative below-the-knee stump following arteriosclerotic gangrene. There was no thought of ambulation at the time of amputation. At home, both patient and physician brought up the subject, against the prejudice of the relatives. A one-legged, prosthetic-wearing representative from a rehabilitation firm came to call on demand. He brought along a one-legged, well prosthetized assistant and a one-legged, excellently prosthetized salesman. These three angels of rehabilitation hopped about the home, up and down stairs, in and out of doors, with the agility of male fleas. Our patient was fascinated. We fitted his prosthesis with an extra-heavy stump-stocking and gave him a walker. By the next month, he was out hoeing his garden! Since he was already retired, our strong endeavors were to return him quickly to his self-care, gardening, wood-carving, musical instrumentation and other avocational hobbies. He lived long and died happy.

Many a geriatric patient must first walk on a pylon or a mid-leg prosthesis before the high artificial limb may be attempted. A walker, a crutch and parallel bars are of great assistance, but Grandpa must take off eventually. Shoes must be well-fitted, both on the remaining foot of flesh and the foot of the prosthesis.

The toe nails must have good non-traumatic trimming; impromptu paring operations are to be avoided.

As walking begins, it should be in small doses; frequent rest periods alternating with activity yield the best results. This prevents muscle cramps and psychic discouragement. Exposure to severe cold and heat should be avoided. The patient requires coaching as to selection of clothing, body care and personal hygiene. Swimming becomes wonderful exercise, provided the pool is not too chilly.

Soon comes the adjustment to home, job, or avocation. All associates must avoid causing psychic trauma, and the element of pity should be discarded. Competitive visitors who are traumatic snobs may be excluded. "My stump is worse than your stump" is no slogan for the day. The family must now look at itself in the mirror and stop "mothering" the patient. Over-protection becomes deadening. The sad sack can now be promoted to the efficient titan.

If an amputee has not yet retired, I see no broad reason why he should do so. His work may become modified to his new needs or he may take on a part-time job. An executive may now become a clerk. A mechanic may become an apprentice instructor. A part-time hobby could blossom into a livelihood.

Bilateral above-the-knee amputations for the elderly are almost, by definition, creators of wheel-chair invalids. Some patients have succeeded in becoming dwarfs with low-fitting prostheses For myself, I would rather be metamorphosed into an active dwarf than an inactive has-been.

The elderly arm amputee may select a hand masked with a glove on his prosthesis, realizing that one arm is for function and one is for show. However, my experience has covered a few men past 65 who were properly fitted with functional hooks. A farmer did his own chores and could sling a bale of hay with great ease. A mechanic, who owned his own repair shop, maintained his earning power and economic independence, and could manage fine calipering and delicate tooling.

I am certain that the ground has only been scratched in the re-education of the elderly amputee. Much research in Veterans' Rehabilitation centers (*e. g.*, the use of pectoralis loops) will eventually be reflected in geriatric rehabilitation.

D. *The coronary patient*

To my mind, the problems of several score cardiac patients present a more challenging experience than the multiple problems of one miserable sufferer from Parkinson's disease. It is for this reason that I shall dwell on the former and assign the latter to minds more attuned to solving such problems. Moreover, my experience has covered the return of many coronary sufferers to their jobs—a result which so far has not been achieved in the case of Parkinson's disease.

My activities with geriatric myocardial infarction patients begin with the home visit, continue throughout hospital care, eventually revert to the home, and finally to work or satisfactory retirement functioning. In contrast with the amputees, I do not inherit them from another service.

For the purposes of this paper, let us assume that the patient has been properly treated in the hospital and is now home in the bosom of his family following discharge. A typical selection could well be a professor, past 65, but not yet

retired. He is at his best mental peak, lectures with success, and is in the midst of writing a book. His rehabilitation is essential for his family welfare and for his own emotional and professional future.

The coziness of the hospital is now past. The competition of life's aggressiveness will soon begin. The physician on the job must dig behind the camouflage of casualness, so that he may prevent the creation of a chronic invalid. "I am a heart patient" need not be quoted from now to eternity. The proud professor, who once looked down his nose at his less fortunate brothers and thought: "Oh, you miserable ones, how you must envy me!" must not reverse the words to: "Oh, you fortunate ones, how you must pity me!"

Throughout this interval, the physician assumes the stance of optimism. There may be from sixty to ninety days spent in and about the home, before responsibility in work or the profession is again resumed. A year's delay would be deadly.

The awakening of sexual desire is a good sign, and is the first evidence that life does indeed go on. Cardiac function and the patient's physical capacity must now be weighed medically. The identity of the job at hand or the modification thereof, should be acutely within the family doctor's consciousness, as he evaluates the patient's possibilities. A home on one floor is desirable, but stairs can be managed slowly and with measured tread. A poorly informed physician and a well-heeled disability insurance policy make a bad combination for the elimination of a functional neurosis.

In the younger geriatric group (65 to 75 years) about two-thirds of my patients return to either their full or modified jobs, or to constructive retirement activities. Such disasters as cardiac failure and cerebral accidents may enter the picture, but such also is the possibility in other medical fields.

For the patient, *it is a mark of wisdom and accomplishment to go right back on the job and begin where he left off*. His job is where he built up surety of knowledge and where years of happiness bore the fruit of accomplishment and appreciation.

When a geriatric coronary patient has yielded to the urge of invalidism for one or two years, it is like lifting a horse over the fence to get him into a gainful occupation, but with skill and proper psychic sharp-shooting, it can be done. A community geriatric center and work shop may serve as a good compromise. *To do nothing* is to grow stale and musty. *To do something* is a sip of rich wine to the haggard. The physician can well be the agent for a higher level of morale, with independence and stimulus for life itself.

One of my amputees became a coronary patient in his eighties. When he became ambulatory again, his first task was to replace his prosthesis; his next step was a slow stride through the parallel bars and then he settled down to caning chairs for the new bride next door.

The geriatric coronary farmer has much to offer. The son or hired man can perform the "slug work" but 50 per cent of the tasks are available for father's happiness, following his convalescence.

The plastic industries have had considerable success with the employment of such patients, finding them to be meticulous in small matters and good advisers in larger affairs.

Witness also the great numbers of older physicians who have indulged in a myocardial infarction, and have then settled down to a 50 per cent (or more) practice with joy and husbanded security.

XI. SUMMARY

Some of the problems and some of the victories of geriatric rehabilitation have been presented, including a discussion of such factors as the family physician, the rehabilitation centers, the home base for the patient, follow-up techniques, the patient's needs, established routines, prevention of accidents, education and personal appearance.

There have also been included some practical applications, having to do with hemiplegic and paraplegic subjects, amputees and patients with coronary disease.

Activity and Hope are the two watchwords that brew the wine in an old man's soul.

APPENDIX

In any community memorial center, a multi-purpose social wing should be reserved for geriatric citizens, where the rehabilitants may mingle with either their more fortunate fellows or their handicapped equals. Whole or half-whole, they will be able to fulfill some of the following possibilities:

1. *Creative writing* in the fields of prose, poetry and foreign language.
2. *Creative styling* and style shows.
3. *Dramatics*, both creative and recitative. Here is a good opening for "The Man Who Came to Dinner."
4. *Ceramics*. In another paper, I have outlined a quickie mix, consisting of powdered molders' clay, powdered cement and dry water-mix masonry paint, mixed with water to putty texture.
5. *Artistic endeavors*, including oil painting, water colors and finger painting.
6. *Wood carving* and cabinet making, combined with home endeavor.
7. *Musical compositions* and geriatric concerts. The public may come and applaud.
8. *Dancing*, by the lively ones, and *square-dance calling* by the handicapped. Age doesn't prevent one from being "hep."
9. *Public speaking*. Coach and be coached.
10. *Flower arrangements* and gardening instructions. One can wield a hoe from a wheel chair.
11. *Pet shows* and pet care. Mate up the parakeets and watch the babies come.
12. *Swimming participation*. Unbuckle the prosthesis and hop in.
13. *Ice review*. The rehabilitants may create the artistry. I once knew an old lady, who took first prize in ice-skating at age 81.
14. *Camera clubs* and prize displays.
15. *History section*. Original papers may be prepared in conjunction with the local historical society.
16. *Travelogues*. Here one displays his glorious past.
17. *Leather work*. Lesser dubs may be taught by better dubs.
18. *Hammered metal work*. Noise does not matter.
19. *Basket weaving*. Carry home one product in another.
20. *Knit-and-purl groups*. Even the proud male may compete.
21. *Americanization program*. Here the foreigner in our midst may absorb from the wise ones, with heads still intact.
22. *Tall-tale Club*. There is no limit.
23. *Stamp and coin hobbies*. Much swapping gets under way.
24. *Doll making*, and toy repairing for the grandchildren.

25. *Health forums*. Panel discussions are popular.
26. *Typing classes*. *See* text regarding one-armed typist.
27. *Nature study* and bird watching. Nostalgic reminiscing is permissible.
28. *Food classes*. Here Grandma can add proteins, vegetables and fruits to her tea-and-toast mainstay.
29. *Marketing discussions*. The dollar sign and the calories are formally introduced.
30. *Extension courses*. These are available from the nearest university.
31. *Card playing*. Other parlor tricks are not excluded.
32. *Practical nursing instructions*. Fortunate rehabilitants may be taught to care for the less fortunate old folks.

Although unable to bring up the subject of Bingo, I have mentioned at least 32 possibilities. There are numerous further slants in these categories. Where will the instructors come from? The old folks will sprout their own talent.

My remarks are directed and especially dedicated to the younger family physicians of America. These budding hopefuls must become actively interested in the problems of rehabilitation in the geriatric field, where the rest of us have so timidly been treading, in the scientific penumbra.

REFERENCES

1. Stieglitz, E. J., editor: Geriatric Medicine: Medical Care of Later Maturity, ed. 3. Philadelphia, J. B. Lippincott Co., 1954.
2. Lyons, J. S., and Trulson, M. F.: Food practices of older people living at home, *J. Gerontol.* **11:** 66, 1956.
3. Bortz, E. L.: New goals for maturity, *J. Gerontol.* **9:** 67, 1954.
4. Neu, H. N.: Rehabilitation, the third phase of medical care, *Nebraska State M. J.* **38:** 315, 1953.
5. Rusk, H. A., and Marks, M.: Rehabilitation following cerebro-vascular accident, *Southern M. J.* **46:** 1043, 1953.
6. Kaufman, J. G., and Becker, M. C.: Rehabilitation of the patient with myocardial infarction, *Geriatrics* **10:** 355, 1955.
7. Harpuder, K.: Rehabilitation of the patient with arterial disease of the limbs, *Geriatrics* **10:** 451, 1955.
8. McClellan, W. S.: Spa therapy and rehabilitation for the aged, *Geriatrics* **10:** 333, 1955.
9. Rusk, H. A.: Rehabilitation—A vital part of civil defense, *Geriatrics* **10:** 496, 1955.
10. Abramson, A. S., and Ebel, A.: Rehabilitation in the management of prolonged illness, *Med. Clin. North America* **37:** 915, 1953.
11. Bahlke, A. M.: Rehabilitation of the handicapped; place of the official agency, *Med. Clin. North America* **37:** 933, 1953.
12. Rusk, H. A.: Total rehabilitation, *J. Nat. Med. A.* **45:** 1, 1953.
13. Tibbitts, C., Editor: Living Through the Older Years. Proceedings of The Charles A. Fisher Memorial Institute on Aging. Ann Arbor, Univ. Michigan Press, 1949.
14. Arthur, J. K.: How to Help Older People. Philadelphia, J. B. Lippincott Co., 1954.
15. Homburger, F.: The Medical Care of the Aged and Chronically Ill. Boston; Little, Brown & Co., 1955.
16. Bortz, E. L.: Stress and aging, *Geriatrics* **10:** 93, 1955.
17. Mathiasen, G.: The continued employment of older workers, *Geriatrics* **10:** 137, 1955.
18. Johnstone, R. T.: The importance of geriatrics in industrial medicine, *J. Am. Geriatrics Soc.* **3:** 117, 1955.
19. McIntire, R. T: America needs the older handicapped worker, *J. Am. Geriatrics Soc.* **2:** 203, 1954.
20. Bortz, E. L.: Making life longer and better, *Geriatrics* **8:** 510, 1953.
21. Stieglitz, E. J.: Constructive medicine in aging: a therapeutic objective, *Geriatrics* **10:** 151, 1955.

22. Stroud, W. D.: Patients with healed myocardial infarction should work, *Geriatrics* **10:** 184, 1955.
23. Ross, C. H.: Geriatrics and the aging personality, *J. Michigan State Med. Soc.* **54:** 545, 1955.
24. Levy, R. L.: The coronary problem in relation to aging, *J. Am. Geriatrics Soc.* **1:** 821, 1953.
25. Feuer, S. G.: A realistic approach to rehabilitation in geriatrics, *J. Am. Geriatrics Soc.* **1:** 840, 1953.
26. Chalfen, L.: Planning leisure-time activities of the aging, *Geriatrics* **10:** 245, 1955.
27. Gitman, L.: Blueprint for a geriatric center, *Geriatrics* **10:** 487, 1955.
28. Walker, W. J.: Should the patient with a healed myocardial infarction avoid physical exertion? *J. Am. Geriatrics Soc.* **3:** 959, 1955.
29. Eisert, O.: Dynamic exercises after lower extremity amputation. Rehabilitation of the elderly amputee, *Geriatrics* **11:** 65, 1956.
30. Wachs, M.: A day activity program in a home and hospital for the aged, *Geriatrics* **11:** 220, 1956.
31. Ross, C. H.: Geriatric exercise, *J. Michigan State Med. Soc.* **55:** 1222, 1956.

THE SURGICAL TOLERANCE OF THE ELDERLY PATIENT. REVIEW OF 148 SELECTED CASES OF BILIARY-TRACT, GASTRIC AND COLONIC LESIONS

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In 1954 we presented a clinical study of the results of major abdominal surgery in the elderly patient (1). The original group of 106 consecutive patients 70 years of age or older were treated during the eleven-year period from January 1, 1941 through December 31, 1951. The series has now been enlarged to include 148 patients for the fifteen-year period from January 1, 1941 through December 31, 1955 (Table 1). As in the previous study, these elderly patients 70 years of age and over were subjected to major abdominal surgical procedures on the private and ward services of the senior author at the Mount Sinai Hospital. This series does not represent all who were treated. It is a selected group in whom the magnitude of the operation performed on the biliary tract, stomach or colon represented a maximum challenge to body reserves. It was felt that in this way surgical tolerance could be most profitably analyzed. Several patients were operated upon more than once. Patients who succumbed following simple colonic decompression are not included in the figures, since they did not survive to undergo a major excisional operation. Although it is true that the inclusion of such cases would have drastically altered the mortality figures, it is obvious it would have neither served the purpose of this study nor enhanced its value.

PREOPERATIVE EVALUATION AND PREPARATION

General principles

Old age per se is rarely a contraindication to operation. The fact that survival has been maintained in spite of all previous vicissitudes speaks for a physical constitution which must possess vital organs of good functioning capacity. It is scarcely necessary to remind physicians and nurses that the care of the aged requires sympathy, tact and understanding. These patients welcome reassurance, and often an octogenarian will brighten when told he will tolerate operation. The elderly are annoyed and frightened by trifling details. They do not enjoy restrictions of their established habits, and the latter should be interfered with as little as is compatible with proper professional care.

Many elderly patients are in a relatively poor state of nutrition. Although less food is required because of reduced activities and lower levels of metabolism, many, either because of ignorance or economy, suffer from the effects of improperly balanced or inadequate diets. Then, too, prolonged infection, cancer and bleeding may further deplete stored glycogen, fat, available protein and vitamins. All these possess important nutritional values, especially in times of stress and starvation. Oral alimentation which is high in protein and rich in vitamin C (essential for wound healing and resistance to infection) and vitamin

TABLE 1. *Material Studied*

Type of Lesion	No. of Patients	Operations
Biliary-tract	34	37
Colonic	73	79
Gastric	41	41
Total	*148*	*157*

B complex (a participant in many cellular reactions) is generally accepted as excellent preoperative preparation. Often this is impracticable because of the necessity of urgent surgery. In this event, parenteral therapy (including blood transfusions) is frequently required in order to correct rapidly severe anemia, hypoproteinemia, vitamin deficiencies and electrolytic imbalances.

There is a definite ceiling on the rate of both hemoglobin synthesis and red blood cell regeneration (2, 3). A defect in hemoglobin synthesis has been identified in chronic infections (4) and in malignant disease (5, 6), and it is mandatory that hemoglobin deficiency be corrected preoperatively.

The existence of certain priorities for the selective replacement of specific body proteins has been established: 1) hemoglobin (7); 2) tissue protein and plasma globulin; and 3) plasma albumin (8). If hemoglobin deficits are corrected prior to operation, then such protein reserves as are available can be utilized for wound healing.

The diminished reserve and the magnitude of associated disease in these patients leave little margin for error. Many suffer from hypertension, congestive heart failure and diabetes. Their preoperative preparation calls for close cooperation between the surgeon and the internist. Electrocardiograms are always obtained in addition to a routine complete blood examination, and determination of the blood levels of proteins, urea, chloride, sodium and potassium. It is highly essential that any clinical imbalances and fluid disturbances be corrected prior to operation.

A word of caution is in order regarding routine hemoglobin and blood protein determinations. It has been adequately demonstrated (9) that no true correlation exists between the concentration of hemoglobin as measured in grams per 100 ml. and the total circulating hemoglobin mass, or between the hematocrit reading and the deficit in circulating hemoglobin. Similarly, there is no correlation between the level of plasma proteins as measured in grams per 100 ml. and the total circulating plasma proteins or plasma protein deficit. The concentration values commonly recorded on the hospital chart are significant only when the blood volume, including all its components, is normal. Calculations of total blood volume, plasma volume, circulating hemoglobin, and circulating protein deficits are the only satisfactory bases for accurate replacement. Bosch and his associates (9) demonstrated that reliance on routine hemoglobin and serum protein determinations has resulted in inadequate blood replacement, as compared with the requirements based on blood volume determinations.

The problem at hand may well be compared to the "chronic shock" syndrome observed by Lyons and his co-workers among injured soldiers in World War II (10, 11). The chronically ill patients studied by this group presented a picture characterized by 1) loss of weight, 2) diminished tolerance for loss of blood during necessary surgical procedures, 3) delayed or faulty healing of wounds, 4) retarded convalescence, 5) reduced blood volume with a deficiency in total circulating red blood cell mass marked by reduction of the plasma volume, and 6) increased interstitial fluid volume.

Unfortunately the determination of blood volume is neither simple nor inexpensive; consequently, such studies upon all elderly patients are not feasible in the average hospital. Practically, however, whole blood transfusions in sufficient quantities should be administered to restore the total circulating red blood cell mass. During this repletion of blood volume the cardiovascular status of the patient must be carefully observed so that right heart failure and pulmonary edema do not occur.

Specific procedures

General principles of preoperative preparation have been discussed, but there are other preparative measures necessary under specific conditions.

Patients with stenosis at the pyloroduodenal junction secondary to ulcer disease or carcinoma have large dilated atonic edematous stomachs filled with retained secretions and ingested food. Unless the stomach is completely evacuated, these patients are in danger of aspiration during anesthesia. In our Clinic, several days are devoted to morning and evening gastric lavages with a large Ewald tube, utilizing several quarts of tap water at a temperature of 105°F. The volume of retained gastric contents is carefully noted at each aspiration, and operation is not usually undertaken before the retention has fallen to 100 ml. or less. This practice has diminished the danger of aspiration and of contamination of the peritoneal cavity during surgery; moreover, edema of the stomach wall has been lessened, resulting in better healing.

The utmost attention must be paid to the frequently severe hypochloremia, hypopotassemia, alkalosis and dehydration which result from vomiting due to long-standing pyloric obstruction aggravated by the leeching effect of gastric lavages. As much as 2,000 to 3,000 ml. of isotonic sodium chloride solution may be required daily for correction of the electrolyte deficits. Since vomiting results in a greater loss of chloride than of sodium, care should be taken not to administer excess sodium. A 2 per cent solution of ammonium chloride is effective, since it furnishes chloride without additional sodium. Potassium chloride is added to the solutions as required. Occasionally, markedly depleted patients require hypertonic sodium chloride. However, caution must be exercised to avert overcorrection when using this type of fluid.

Daily determinations of the levels of serum sodium, chloride and potassium, the carbon dioxide-combining power, and the urinary output provide the necessary information for varying the amounts and types of fluid and electrolytes during the preoperative period.

The oral use of sulfonamides and antibiotics in the preoperative period prior to bowel resection is now generally accepted. It need only be pointed out that the use of sulfonamides demands an increase in the intake of certain vitamins. Succinylsulfathiazole (Sulfasuxidine) administered for four to six days results in marked diminution of the thiamin output in the feces, unless the thiamin intake in the diet is greatly augmented (12).

The physiologic requirement of vitamin K is met in large part by the absorption of vitamins synthesized in the bowel. Reduction of the bacterial population of the colon results in a definite reduction in the synthesis of vitamin K, which may result in hypoprothrombinemia and hemorrhage at the suture line (13). This effect can be overcome by the oral administration of vitamin K during the preoperative period.

Daily purgation and colonic flushes are utilized to clear the colon of gross fecal content. If a preliminary cecostomy or colostomy has been performed, then these stomata are irrigated as well.

ANESTHESIA

In our series, preanesthesia medication was always individualized. Doses were generally two-thirds to half of those used in younger adults and, because of the slower absorption in the aged, the premedication was administered earlier. Its effect usually lasts longer owing to delayed excretion and detoxification. In the patient with mental confusion due to advanced cerebral arteriosclerosis or other causes, barbiturates and scopolamine hydrobromide are to be avoided, as they are likely to cause excitement and restlessness.

We agree with Lundy (14) that reduction in the risk of anesthesia can best be accomplished if the anesthetist is skilled, regardless of the agent employed. The various anesthetic modalities employed are summarized in Table 2.

Spinal anesthesia was utilized without complications in 86 cases (54.8 per cent). It has definite advantages. It affords unsurpassed relaxation, providing the basis for good exposure and easy access to all intra-abdominal viscera. It improves the circulation of the lower extremities, and a beneficial diuretic effect has been described. When there is a recent history of congestive heart failure, spinal anesthesia is considered best, since it causes peripheral vasodilation which acts as a bloodless phlebotomy (15). We are aware that high spinal anesthesia paralyzes the vasoconstrictive mechanism of the splanchnic bed and may induce

TABLE 2. *Anesthesia (all cases)*

Anesthetic Agent	No. of Operations
Spinal	86
Cyclopropane	30
Nitrous oxide, oxygen, ether	15
Ethylene	14
Avertin	4
Local	8
Total	*157*

a marked fall of blood pressure that may be difficult to correct, especially in the presence of hypertension and advanced arteriosclerosis (16). In our experience, however, the competent anesthetist has avoided these pitfalls.

General anesthesia was utilized in 63, or 40.1 per cent of the cases. In recent years, succinylcholine has been the supplemental muscle relaxant used concomitantly in most of the patients undergoing general anesthesia.

In 8 patients who were particularly poor risks, both local and regional anesthesics were employed, since these agents apparently cause minimal interference with the function of the organism as a whole. Aged patients, because of their decreased reflex irritability and poor sensitivity, seem to tolerate these forms of anesthesia well.

SURGICAL INDICATIONS, PROCEDURE, AND OPERATIVE FINDINGS

If operative mortality and postoperative morbidity are to be kept at a minimum, all general surgical principles must be carefully observed and operative procedures should be expeditiously performed with minimal trauma.

The following is a brief summary of the specific surgical indications, operative findings, and procedures in the various groups:

Biliary-tract surgery (Tables 3 and 4)

There were 34 patients in this group, undergoing 37 operations; 3 patients had 2 operations. The ages ranged from 70 to 85 years (average 73 years). There were 10 men and 24 women, thus supporting past observations of the preponderance of gallbladder disease in women.

Several patients demanded relief because of repeated severe attacks of gallstone colic. Biliary-tract infections manifested by the Charcot syndrome and not responding to adequate doses of antibiotics were treated surgically, as were cases of acute cholecystitis with or without the presence of a mass. Gangrene of the gallbladder with early perforation and generalized peritonitis is a frequent occurrence, especially in the aged diabetic patient.

TABLE 3. *Pathologic Conditions in Biliary-Tract Cases*

	No. of Cases
Chronic cholecystitis in gallbladder remnant	1
Chronic cholecystitis, cholelithiasis	9
Chronic cholecystitis, cholelithiasis, choledocholithiasis	13
Choledocholithiasis	4
Acute cholecystitis, cholelithiasis	6
Carcinoma of gallbladder	2
Total	*35**
Associated diseases	6
Biliary cirrhosis	1
Acute cholangitis	2
Chronic pancreatitis	1
Cholecystoduodenal fistula	2

* One patient had two operations.

TABLE 4. *Analysis of Surgical Procedures in Biliary-Tract Cases*

	No. of Operations
Cholecystectomy (primary)	11
Cholecystectomy (secondary)	2
Cholecystectomy (primary) with common-duct exploration	10
Cholecystectomy (primary) with common-duct exploration and closure of cholecystoduodenal fistula	1
Cholecystectomy (secondary) with common-duct exploration	2
Cholecystectomy (primary) with common-duct exploration and duodenotomy	1
Cholecystectomy (primary) with common-duct exploration, duodenotomy, sphincterotomy and closure of cholecystoduodenal fistula	1
Common-duct exploration	3
Common-duct exploration and duodenotomy	1
Cholecystostomy	3
Cholecystostomy with common-duct exploration	2
Total	*37*

A wide spectrum of biliary-tract disorders was observed. The gallbladder, invariably containing calculi, was usually only a shrunken vestige embedded deeply in the liver and surrounded by multiple adhesions which distorted contiguous structures. Cholecystectomy, the treatment of choice, was performed in 28 cases.

Following the recognized indications for choledochostomy, the common duct was explored in 20 cases, with or without an associated operation on the gallbladder. In 3 cases an impacted ampullary calculus was removed by transduodenal choledochostomy. Of the 2 patients in whom choledochostomy failed to reveal calculi, one was a 72-year-old woman who had had a cholecystectomy for calculi thirty-two years previously; a chronically inflamed stoneless gallbladder stump was found. The other was a 70-year-old man who had chronic cholecystitis with lithiasis and acute cholangitis.

The results of choledochotomy in the geriatric patients were particularly significant, in that 88 per cent of the explored common ducts were found to harbor stones. We agree with Glenn (17) that there is an increased incidence of choledocholithiasis in the aged.

There were 6 cases of acute cholecystitis. In 4, cholecystectomy was performed uneventfully. One of these patients, 79 years of age, required re-operation two years later because of recurrent right upper-quadrant pain. The common duct contained gravel and sludge; it was drained, and recovery ensued. The remaining 2 patients underwent cholecystostomy.

There were 2 cases of carcinoma of the gallbladder associated with cholelithiasis. In one of these patients, who was desperately ill, exploration was carried out during an attack of acute cholecystitis; because of the density of adhesions, the thick-walled gallbladder containing a solitary cholesterol stone was simply drained. Exploration was again performed on the twenty-seventh postoperative day, because of a persistent "spiking" temperature record. This procedure revealed carcinomatous metastases in the right lobe of the liver and extension to the porta hepatis and gastrohepatic ligament. Death occurred two days later.

The second case of carcinoma of the gallbladder was seen during a subacute stage associated with jaundice. At operation the gallbladder was thick-walled, was distended with mucopurulent fluid, and contained many facetted stones. Cholecystostomy and choledochostomy were performed. Convalescence was uneventful. This woman underwent exploration six months later for recurring right upper-quadrant symptoms, at which time the gallbladder was thick-walled, its posterior wall being stony hard. The common duct was normal. The excised gallbladder was the seat of an infiltrating adenocarcinoma.

In view of the fact that the carcinomatous condition was not suspected in these 2 cases, it is now our policy to remove a portion of the gallbladder for pathologic examination in all cases of acute cholecystitis in which cholecystostomy is performed. Although the small size of the present series obviates the statistical validity of interpretations of the data (2 cases of carcinoma in 30 cases of cholelithiasis), the relation of chronic gallstone irritation to carcinoma may be significant. In dealing with the aged, it is well to recall that 85 per cent of cases of carcinoma of the gallbladder in which the presenting complaint is not liver metastasis, are clinically indistinguishable from non-malignant biliary-tract disease (17).

Colonic surgery (Tables 5 and 6)

In this group, 73 patients underwent 79 operations upon the colon. Their ages ranged from 70 to 83 years, with an average of 73 years. There were 45 men and 28 women.

The surgical procedures performed depended upon the degree of obstruction, as revealed by x-ray examination, and on the location of the lesion. In patients

TABLE 5. *Pathologic Conditions in Colon Surgery Group*

Lesion	No. of Cases
Carcinoma	
Cecum	14
Ascending colon	4
Hepatic flexure	2
Transverse colon	2
Splenic flexure	1
Descending colon	5
Sigmoid (primary)	13
Sigmoid (recurrent)	2
Rectosigmoid	7
Rectum	19
Total	*69*
Lymph nodes involved	18 (22.8%)
Lymph nodes not involved	61 (77.2%)
Villous adenoma of splenic flexure	1
Acute diverticulitis of sigmoid colon	1
Carcinomatous sigmoid polyp	1
Benign pedunculated adenomatous sigmoid polyp	1
Coexisting adenomatous polyps in cases of carcinoma	22 (31.4%)

TABLE 6. *Analysis of Surgical Procedures in Colon Cases*

	No. of Operations
Ileocolic resection with ileo-transverse colostomy	18
Transverse colon resection with end-to-end anastomosis	1
Splenic flexure resection with end-to-end anastomosis	2
Descending colon resection with end-to-end anastomosis	5
Sigmoid resection with end-to-end anastomosis	12
Anterior resection with end-to-end anastomosis	10
Combined abdomino-perineal resection (Miles)	14
Two-stage abdomino-perineal resection (in 1 patient)	2
Lockhart-Mummery: sigmoid colostomy and perineal resection	2
Obstructive resection	8
Transverse colon	1
Descending colon	1
Sigmoid colon	6
Sigmoidotomy and excision of polyp	2
Exploratory laparotomy for early postoperative obstruction of small intestine	2
Ileo-transverse colostomy to by-pass a recurrence at the suture line 1½ years following ileocolic resection for carcinoma of ascending colon	1
Total	*79*

with acute intestinal obstruction, after a short period of hydration, the bowel was decompressed by colostomy or cecostomy prior to definitive resection. No time was wasted by the introduction of a long intestinal tube.

Right colonic neoplasms were treated by ileocolic resection and ileotransverse colostomy in 18 cases. Left colonic neoplasms were treated by segmental colonic resection in 38 cases. In recent years, we have usually preferred a primary resection with end-to-end anastomosis and complementary colostomy or cecostomy rather than obstructive resection, even in the poor-risk obese patient with chronic obstruction. We have continued to perform palliative resections in cases with obstruction, regardless of hepatic metastases.

A few patients with carcinoma of the rectum who were especially poor risks were treated by fulguration. Abdominoperineal resection was carried out in 14 patients. We have tended to veer away from anterior resection for carcinoma of the rectum because of the high rate of recurrence (18). However, it may be indicated in some elderly patients, especially those affected by the infirmities of time, who often live alone and have defective vision and senile psychosis. This group is utterly unable and frequently unwilling to cope with the demands of even a well-functioning colostomy. It would appear advisable to sacrifice some of the principles of cancer surgery to allow the more infirm of these patients to spend their remaining months or years with a normal-functioning anus. Anterior resection was therefore performed in 10 instances.

With 2 exceptions, all the resected lesions were carcinoma, the exceptions being obstructing diverticulitis and villous adenoma of the splenic flexure. The tumors were located in various parts of the colon, but 59 per cent occurred in the sigmoid, rectosigmoid and rectum. Coexisting adenomatous polyps were

present in 31.4 per cent of these cases, a fact which emphasizes the importance of polyps as precursors of carcinoma (19).

The incidence of lymph-node metastasis presents an interesting side-light. Of the 69 carcinomas, 61 (77.2 per cent) did not involve lymph nodes. Only 18 (22.8 per cent) of the nodes were involved by metastatic carcinoma. Gilchrist and David (20) in a review of 200 cases of carcinoma of the colon and rectum noted a 62.5 per cent incidence of lymph node metastasis, and Grinnell (21) noted 47 per cent in a series of 322 specimens. Accurate comparison with the present small series of elderly patients cannot be made, but it is of interest that there was such a low rate of lymph-node metastasis as compared with series covering all age groups. We can only speculate on the relatively low incidence of lymphatic spread in these patients past 70 years of age.

Gastric surgery (Tables 7 and 8).

There were 41 patients in this group. Their ages ranged from 73 to 84 years (average 73 years). The cases were equally divided between men and women. Most cases of severe hemorrhage, either of gastric or of duodenal origin, were treated conservatively We feel now that this was a mistake. Although the bleeding ceased spontaneously in many patients, others died of hemorrhage or of the eventual results of blood loss, *e.g.*, myocardial infarction. We are now convinced that emergency operation should be performed, especially if hemoglobin values are not maintained by adequate transfusions of blood during the first twenty-four hours. Surgical treatment was carried out in 11 cases of duodenal

TABLE 7. *Pathologic Conditions in Gastric Surgery Group*

	No. of Cases
Carcinoma of the stomach	19
Lymphosarcoma of stomach	1
Benign gastric ulcer	10
Duodenal ulcer	11
Total	*41*

TABLE 8. *Analysis of Surgical Procedures in Gastric Cases*

Type of Operation	No. of Operations
Subtotal gastrectomy	22
Subtotal gastrectomy, resection of transverse colon with end-to-end anastomosis	1
Subtotal gastrectomy and feeding jejunostomy	1
Total gastrectomy	2
Gastro-enterostomy	7
Gastro-enterostomy and bilateral infradiaphragmatic vagotomy	3
Gastro-enterostomy and feeding jujunostomy	2
Kelling-Madlener operation	1
Gastro-enterostomy with exclusion of carcinoma of distal stomach	2
Total	*41*

ulcer with intractable pyloric obstruction due to scarring. A gastro-enterostomy was performed with complementary infra-diaphragmatic vagotomy in those cases in which gastric analysis revealed elevated values for free hydrochloric acid. In 1 case of a gastric ulcer which was juxta-esophageal and proved to be benign, the operation was a Madlener procedure (gastric resection distal to the ulcer). Criticism may be leveled because of the possibility of mistaking a benign ulcer for carcinoma, but this is no worse than performing a total gastrectomy for benign ulcer in patients over 70 years of age. Complementary jejunostomy has advantages for alimentation in long-standing cases of pyloric obstruction with marked gastric dilatation, debility, anemia and hypoproteinemia.

There were 19 cases of gastric carcinoma. Most of the lesions were large, either by palpation or on x-ray examination, and evidently had been present for a long time before causing symptoms. Large size does not necessarily imply inoperability; a carcinoma which is locally inoperable often may be treated palliatively. In all our cases exploration was carried out unless ascites, demonstrable liver metastases, or a palpable rectal shelf indicated inoperability.

A high subtotal gastrectomy with removal of the omentum and glands was performed in 15 cases. In 2 patients, the operation was total gastrectomy because of the extensive involvement of the stomach without evidence of distant metastases. Two locally unresectable pyloric and antral lesions fortunately could be side-tracked, and continuity restored by gastro-enterostomy—a procedure which affords a fair degree of palliation.

POSTOPERATIVE CARE AND COMPLICATIONS

Careful attention to every detail yields worthwhile dividends. A complication in the postoperative period of an elderly patient is surmounted with difficulty and, if not fatal, results in a much greater prolongation of hospitalization than in the case of younger persons.

The postoperative complications listed in Table 9 indicate that abdominal and respiratory infections constitute the major hazards in this type of surgery. In our study, these were reduced in number and consequence in the later years, following a better understanding of fluid balance, of early ambulation, and of antibiotics.

Fluid and electrolyte balance must be carefully controlled. The temporary disturbances of electrolyte metabolism following surgery are now well known (22, 23). The usual alterations include marked reduction in the output of sodium. Our patients receive salt-free fluids parenterally in the immediate postoperative period, and physiologic sodium chloride is administered later, when indicated and in limited quantities. Allowances are made for losses by way of the urine, perspiration, intestinal and gastric suction, vomiting, and draining fistulae.

Three patients in this series were given excessive amounts of fluids, resulting in pulmonary edema and cardiac failure. This occurred between the years 1941 and 1944, when the dangers of excess salt and fluid were not fully appreciated.

The dangers of excessive salt-free dextrose administered at the time of surgery and in the immediate postoperative period should be appreciated. Zimmermann

TABLE 9. *Postoperative Complications (all cases)*

	No. of Cases
Cardiovascular system	17
Congestive heart failure	6
Coronary insufficiency	2
Auricular fibrillation	3
Auricular flutter	2
Auricular and ventricular premature contractions	1
Bradycardia	1
Supraventricular tachycardia	1
Thrombophlebitis	1
Respiratory system	22
Bronchopneumonia	11
Atelectasis	3
Pulmonary edema	5
Pulmonary infarct	2
Pleurisy	1
Nervous system	1
Cerebral accident	1
Abdomen	32
Wound infection	9
Wound dehiscence	5
Fecal fistula	3
Biliary fistula	3
Duodenal-stump fistula	1
Peritonitis	1
Paralytic ileus	2
Intestinal obstruction	3
Acute cholecystitis	1
Liver abscess and thrombophlebitis of portal vein	1
Necrosis of colostomy	1
Gastric retention	2
Genito-urinary tract	7
Urinary retention	3
Oliguria	2
Ureteral obstruction	1
Acute epididymitis	1
Miscellaneous	8
Anemia	3
Jaundice	1
Arteriosclerotic gangrene of all toes of left foot	1
Psychosis	3
Total	87

and Wangensteen (24) reported 17 cases of postoperative convulsive seizures in elderly patients in association with dilution of the extracellular electrolytes. In most instances, strongly positive fluid balance was demonstrable by the intake and output data and the change in body weight. They emphasized that these patients are extremely sensitive to water excess for forty-eight hours after surgery. They recommended that no more water be administered than is necessary to

cover predictable fluid losses and assure adequate urinary output. In our experience, 1,500 to 2,000 ml. of 5 per cent dextrose in distilled water is adequate for most elderly patients during the first twenty-four hours after operation.

In our series, the average period of bed rest was three days. The great majority of patients were out of bed on the first postoperative day, and many were mobilized even on the day of operation. If possible, they are urged to walk at the very onset, for in this way pulmonary ventilation is enhanced, venous stasis averted, and urination encouraged. However, a weak patient slumped in a chair is better off supine in bed.

MORTALITY

There were 3 deaths in the biliary-tract group, 3 in the gastric group, and 16 in the colon group—a total of 22 deaths, constituting a patient mortality of 14.9 per cent for the entire study (Table 10).

Upon comparing the early period (1941 to 1948) with the later period (1949 to 1955) there was very little difference in the over-all mortality rates—16.7 per cent and 13.2 per cent, respectively (Table 11). Examination of the individual groups disclosed a decrease (from 32.3 to 14.3 per cent) in the colon group, a questionable decrease (from 7.7 to 6.7 per cent) in the gastric group, and an increase (from zero to 15.8 per cent) in the biliary group.

Gastric surgery is relatively well tolerated in the aged. The significant im-

TABLE 10. *Over-all Mortality*

Group	No. of Deaths	No. of Patients	Mortality (%)
Biliary	3	34	8.8
Colonic	16	73	21.9
Gastric	3	41	7.3
	22	*148*	*14.9*

TABLE 11. *Comparative Mortality—Early vs. Recent Cases*

Period & Group	No. of Deaths	No. of Patients	Mortality (%)
1941–1948			
Biliary-tract	0	15	0
Colon	10	31	32.3
Stomach	2	26	7.7
	12	*72*	*16.7*
1949–1955			
Biliary-tract	3	19	15.8
Colon	6	42	14.3
Stomach	1	15	6.7
	10	*76*	*13.2*

provement in mortality in the colon group represents the result to be expected from better control of infection, increased knowledge of surgical physiology, and improvement of technique.

Two of the 3 deaths in the biliary-tract group may have been preventable. These patients had signs of common-duct obstruction for two and a half and for nine months, respectively, before they were referred for surgical therapy. We cannot over-emphasize the debilitating effects of prolonged biliary obstruction and infection, and we make a strong plea for early surgery in such cases.

The ability of the elderly patient to tolerate primary cholecystectomy in uncomplicated gallbladder disease is indicated by the survival of all 11 patients who underwent this operation.

A summary of the causes of death is presented in Table 12.

EVALUATION OF SURGICAL RISK

One of the aims of this study was to determine, if possible, the probability of survival of a given elderly patient with a known disease and associated complications such as hypertension, coronary artery disease or congestive heart failure.

Renal disease. In the 22 fatalities, none of the patients exhibited evidence of renal damage preoperatively.

Diabetes mellitus. Three patients in the group of fatalities had diabetes, but since the diabetes was never out of control and the cases were not severe, the high mortality for diabetic patients (3 out of 9) appears coincidental.

Previous coronary occlusion. In 2 of the fatal cases there was evidence of previous coronary occlusion—representing a third of the 6 cases so classified preoperatively. One patient died of pulmonary edema due to overloading with salt and water. The other had another myocardial infarct. Although this is a small group, it is our impression that, in the elderly, previous myocardial infarction is a significant factor in the surgical mortality rate.

Congestive cardiac failure. None of the fatal cases had congestive heart failure. Three patients in this series presented this complication preoperatively, and both progressed satisfactorily. In these patients, heart failure was present at the time of admission to the hospital, and it was treated under the usual regimen

TABLE 12. *Summary of Mortality*

Cause of Death	No. of Cases
Cardiac failure	1
Cardiac failure and cholangitis	1
Myocardial infarct	4
Pulmonary embolism	2
Peritonitis	4
Bronchopneumonia	2
Pulmonary edema	3
Cerebral accident	1
Thrombophlebitis of portal vein with abscess of liver	1
Pyelonephritis, hydronephrosis	1
Undetermined	2
Total	22

before operation. A patient with congestive cardiac failure is generally considered a poor surgical risk. Actually, if this complication be properly managed, the operative risk is not unduly great.

Hypertension. Of 43 patients who had hypertension preoperatively, 9 (21 per cent) died. Two died of bronchopneumonia, 2 of peritonitis, 1 of cholangitis and left ventricular failure, 3 of myocardial infarct, and 1 of pulmonary embolism. It would appear that 5 of these patients died of causes directly related to elevation of blood pressure and associated cardiovascular disease. On the basis of these findings, hypertension should be considered as a significant factor in surgical mortality. In our previous survey of this problem (1) we were not as impressed with the dangers of hypertension as we are now.

Obesity. Of 18 patients who were classified as obese preoperatively, 5 (28 per cent) died. It has long been the contention of one of us (R.C.) that obesity constitutes a major hazard.

Anesthesia. In 14 of the 22 fatal cases, anesthesia was spinal, and in 1 it was local. In 4 cases the anesthetic agent was cyclopropane; in 2, ethylene; and in 1, tribromoethanol (Avertin). This distribution represents that in the entire series of cases; consequently, no particular modality can be assigned lethal potentiality.

Nature of operation. Surgical procedures on the colon involve a patient mortality of 14.3 per cent (recent years), and those on the biliary tract, 15.8 per cent. Surgical operations on the stomach are better tolerated, the mortality being 6.7 per cent in recent years.

SUMMARY AND CONCLUSIONS

Geriatric surgery is acquiring increasing importance as our elderly population enlarges.

This report presents a discussion of the preoperative preparation, surgical procedures and findings, mortality rates and postoperative care in 148 selected patients aged 70 years and over, who underwent biliary-tract, gastric, or colonic surgery.

Old age is not a contraindication to surgery. As factors in operative mortality, sex, type of anesthesia, technicalities of operation, and previous congestive heart failure are not important. The nature of the presenting disease and the type of surgical procedure required to correct it are significant factors in operative mortality, as are obesity, hypertension and a history of previous myocardial infarction.

REFERENCES

1. Zeifer, H. D., and Colp, R.: Abdominal surgery in the elderly patient, *A. M. A. Arch. Surg.* **68:** 315, 1954.
2. Fowler, W. M., and Barer, A. P.: Rate of hemoglobin regeneration in blood donors, *J.A.M.A.* **118:** 421, 1942.
3. Alstead, S.: Rate of blood regeneration after hemorrhage, *Lancet* **1:** 424, 1943.
4. Cartwright, G. E.; Lauritsen, M. A.; Jones, P. J.; Merrill, I. M., and Wintrobe, M. M.: The anemia of infection. I. Hypoferremia, hypercupremia and alterations in porphyrin metabolism in patients, *J. Clin. Invest.* **25:** 65, 1946.
5. Taylor, A., and Pollack, M. A.: Hemoglobin level and tumor growth, *Cancer Res.* **2:** 223, 1942.

6. Taylor, D. R.; McAfee, M., and Taylor, A.: The effect of yolk sac cultivated tumors on hemoglobin level in embryonic chick, *Cancer Res.* **3:** 542, 1943.
7. Whipple, G. H., and Madden, S. C.: Hemoglobin, plasma protein and cell protein: their interchange and construction in emergencies, *Medicine* **23:** 215, 1944.
8. Zeldis, L. J.; Alling, E. L.; McCoord, A. B., and Kulka, J. P.: Plasma protein metabolism-electrophoretic studies: chronic depletion of circulating proteins during low protein feeding, *J. Exper. Med.* **82:** 157, 1945.
9. Bosch, D. T.; Islami, A.; Tan, C. T. C., and Beling, C. A.: The elderly surgical patient, *A. M. A. Arch. Surg.* **64:** 269, 1952.
10. Clark, J. H.; Nelson, W.; Lyons, C.; Mayerson, H. S., and DeCamp, P. T.: Chronic shock, *Ann. Surg.* **125:** 618, 1947.
11. Lyons, C., and Mayerson, H. S.: The surgical significance of hemoglobin deficiency in protein depletion, *J. A. M. A.* **135:** 9, 1947.
12. Najjar, V. A., and Holt, L. E., Jr.: The biosynthesis of thiamine in man, *J. A. M. A.* **123:** 683, 1943.
13. Black, S.; Overman, R. S.; Elvehjem, C. A., and Link, K. P.: The effect of sulfaguanidine on rat growth and plasma prothrombin, *J. Biol. Chem.* **145:** 137, 1942.
14. Lundy, J. S.: Anesthesia and supportive therapy for operations on elderly patients with special reference to reduction of operative risk, *Geriatrics* **3:** 361, 1948.
15. Master, A. M.; Jaffe, H. L., and Dorrance, W. R.: The treatment of heart failure: digitalis and mercurial intoxication, penicillin, dicoumarol, major surgery, *New York J. Med.* **50:** 553, 1950.
16. Foldes, F. F.: Some problems of geriatric anesthesia, *Anesthesiology* **11:** 737, 1950.
17. Glenn, F., and Hays, D. M.: The age factor in the mortality rate of patients undergoing surgery of the biliary tract, *Surg., Gynec. & Obst.* **100:** 11, 1955.
18. Dunphy, J. E., and Broderick, E. G.: A critique of anterior resection in the treatment of cancer of the rectum and pelvic colon, *Surgery* **30:** 106, 1951.
19. Lockhart-Mummery, J. P., and Dukes, C.: The precancerous changes in the rectum and colon, *Surg., Gynec. & Obst.* **46:** 591, 1928.
20. Gilchrist, R. K., and David, V. C.: A consideration of pathological factors influencing five year survival in radical resection of the large bowel and rectum for carcinoma, *Ann. Surg.* **126:** 421, 1947.
21. Grinnell, R. S.: Lymphatic metastases of carcinoma of the colon and rectum, *Ann. Surg.* **131:** 494, 1950.
22. Coller, F. A.; Campbell, K. N.; Vaughan, H. H.; Iob, V., and Moyer, C. A.: Postoperative salt intolerance, *Ann. Surg.* **119:** 533, 1944.
23. Moyer, C. A.: Acute temporary changes in renal function associated with major surgical procedures, *Surgery* **27:** 198, 1950.
24. Zimmermann, B., and Wangensteen, O. H.: Observations on water intoxication in surgical patients, *Surgery* **31:** 654, 1952.

MORBIDITY AND MORTALITY IN OLD AGE. A STUDY OF EXPERIENCE IN A MODERN HOME FOR THE AGED. PART VIII*

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SUMMARY AND CONCLUSIONS

The purposes of this study have been two in number: 1) to provide a reliable and comprehensive body of data on morbidity and mortality in old age based on information derived from the records of the Medical, Psychiatric, and Social Service Departments of the Home for Aged and Infirm Hebrews in New York City, and 2) to compare these data, whenever possible, with those of published reports in order to determine whether or not a differential morbidity or mortality exists.

The Home for Aged and Infirm Hebrews

Entry into the Home is limited to those residents of New York City, Nassau and Westchester counties who are 60 years of age or over and meet the following criteria: 1) they must be free of communicable disease and aggravated mental conditions; 2) the results of a psychiatric and social evaluation must indicate that they are able to adjust adequately to group living; 3) they must be indigent, or nearly so; and 4) they must require the type of care and solace that only institutional life can provide.

Between 1945 and 1951, applications from men for admission to the Home increased fivefold, whereas applications from women increased sixfold. Moreover, since the various old age assistance programs have the effect of permitting more and more aging persons to live independently in the community for as long as their physical ability permits, applications from the chronically ill are increasing and will continue to increase. However, infirmary space at the Home represents only 12 per cent of the total beds available, and dormitory space only 56 per cent of the total. Because of the disproportionate size of the ambulatory quarters, the neediest applicants (the sickest) sometimes wait three years for admission.

Mortality

A method for obtaining accurate life-table death rates for small cohorts that can be followed over a period of years has been described. The life tables con-

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This study was carried out under the auspices of the Home for Aged and Infirm Hebrews of New York and is based on the medical and social records of this institution.

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structed are the first of their kind for the type of population group studied, and depict the state of health of the members of the Home, by summarizing the effect of a given set of age-specific death rates. These life tables should prove advantageous to administrators of institutions for the aged that admit groups similar to those studied at the Home for Aged and Infirm Hebrews, since the q_x values can be summarized conveniently by the survivorship column, thus permitting the computation of the probability of a resident of stated age surviving a given number of years.

Life-table mortality rates for the residents of the Home were computed in five-year age groups for each of the three time-periods of the study. No significant differences were observed in the q_x values for the three time-periods. However, comparison with the age-specific life-table death rates for the white population of the United States in 1939–1941 and in 1950 showed that the rates for the residents of the home were significantly higher.

Mortality in the Home

Following the rules of the 6th Revision of the International List of Causes of Death, it was found that coronary disease, intracranial lesions of vascular origin, and chronic nephritis accounted for 38 per cent of all male deaths and 36 per cent of all female deaths; pneumonia and influenza contributed 14 per cent of the total male deaths and 12 per cent of the total female deaths; diabetes mellitus caused 4 per cent of all male deaths and 6 per cent of all female deaths; carcinoma (all forms) caused 16 per cent of all male and 9 per cent of all female deaths. No time trends were noted in the period from 1935 to 1951, despite the fact that major changes in the treatment of infectious diseases occurred during this period.

It is possible that the effects of chemotherapy and antibiotics on the death rates for specific causes may have been obscured by the grouping of the data, since disease-specific rates were calculated for the entire group without respect to age. Possible improvements from chemotherapy might be counterbalanced by the aging population of the Home.

It was observed in aging patients that antibiotics, although easing the suffering by rapidly diminishing fever and pain, prevent neither the drain on the vital powers nor the irreversible damage to the cardiovascular renal systems. Thus, if recovery ensues, the patient's reserves are so depleted as to leave him vulnerable to further infection and death due to failure of the cardiovascular apparatus. Therefore, improvements in therapy did not significantly decrease the death rates for specific diseases or for all causes.

Observed deaths at the Home, 1935–1948, allocated to underlying causes by the rules of the 5th Revision of the International List and the Manual of Joint Causes, were studied and comparisons were made with the total experience of the white population of the United States for similar age groups, and for the same time-interval. The chief differences noted were: 1) cardiovascular renal disease caused 42 per cent of the observed male deaths and 40 per cent of the observed female deaths at the Home, whereas on the basis of proportionate

mortality in the total United States experience, the anticipated percentages were 61 per cent for the males and 60 per cent for the females; 2) 26 per cent of the observed male deaths and 28 per cent of the female deaths were due to malignant neoplasms, whereas the expected percentages were 13 per cent for the males and 15 per cent for the females; 3) 17 per cent of the observed male deaths and 15 per cent of the observed female deaths were allocated to pneumonia and influenza, whereas the anticipated percentages on the basis of the United States experience were 5 per cent for the males and 5 per cent for the females; and 4) 8 per cent of the male deaths and 11 per cent of the female deaths were contributed by diabetes mellitus, whereas the anticipated proportions were 2 per cent for the males and 5 per cent for the females.

Deaths were also apportioned to underlying causes for the period 1949 to 1950 in accordance with the regulations of the 6th Revision of the International List of Diseases and Causes of Death, and corresponding comparisons were made with the total United States experience for the same period. In this comparison, somewhat similar differences were noted regarding cause-of-death.

The relatively accurate cause-of-death data at the Home (based either on autopsy protocols or on carefully recorded thorough investigations, usually over a considerable period of time) were compared with the relatively inaccurate data obtained from death certificates. Perhaps most errors in present mortality data occur in the chronic degenerative diseases, because of the problems of multiple causes of death, and because diagnostic facilities are usually not readily available to the physician in determining the cause of death. It is recommended that local health departments devise means to make death certificates more useful, factual and accurate documents.

To achieve this goal, local health units should: 1) seek to increase the amount of reliable data on cause-of-death by educating the public to the benefits to science afforded by autopsies and by educating the physician to wait for the autopsy report, whenever possible, before completing a death certificate; 2) encourage revision of death certificates already filed by removal of legal obstacles, by educating physicians and hospitals to submit significant supplementary data, and by separating the medical portion of the certificate from the legal portion; 3) instruct physicians on the correct method of completing a death certificate and how to evaluate the pathology involved; 4) employ medical statisticians to question physicians about cause-of-death data; and 5) redesign death certificates to make room for any additional pathologic data the physician may wish to report. From all these data, a thorough analysis could be made of multiple causes of death.

Morbidity

Seventy-one of the 98 residents (72 per cent) discharged to state mental institutions during the period 1935–1951 suffered from chronic brain syndrome of some category. On the basis of data relating to first admissions to state mental hospitals in the United States, in 1948, the anticipated number of diagnoses calculated for chronic brain syndrome was 85.4 (87 per cent). The significant

difference between the experience of the Home and that of the community at large was probably due to differing diagnostic techniques and nomenclature and to the effect of selective admission policies.

Survival rates for these discharged former residents were calculated. The survival rates (both sexes combined) for each year of a six-year period of follow-up, from the first to the sixth, were found to be 59, 36, 29, 20, 16 and 13 per cent, respectively. These survival rates were similar to those of 239 patients, 65 years of age and over, residing in the state mental hospitals of Maryland.

The prevalence of mental disorder at the Home on July 1, 1952 was 167.6 per thousand (males, 139.4; females, 183.5). This was significantly higher than the prevalence rate in Williamson County, Tennessee (69.4 per 1000) or the Eastern Health District of Baltimore (60.5 per 1000). These differences were felt to be due to the following causes: 1) In both Williamson County and the Eastern Health District of Baltimore, all age groups were sampled. 2) In both these surveys no cases were examined by staff psychiatrists, whereas every diagnosis at the Home was made by a competent psychiatrist.

The prevalence of mental disorder at the Home was also significantly higher than the prevalence in white persons, 65 years of age and over, residing in Williamson County, Tennessee (58.6 per 1000). This difference may have been caused by under-enumeration of elderly mental patients, either because they were already in mental institutions or because their mental aberrations were considered "normal" for their age by the reporting agency.

The results of the psychiatric evaluation of 381 residents examined between January 1, 1951 and December 1, 1953, were classified and listed by sex and by nativity. It was shown that 33 per cent of the total male diagnoses and 43 per cent of the total female diagnoses were for chronic brain syndrome; 46 per cent of all male diagnoses and 21 per cent of all female diagnoses were attributed to some form of psychoneurosis; and 19 per cent of all male referrals and 10 per cent of all female referrals were apportioned to "no psychiatric condition" or to "neurologic examination only." The male rate for diagnosis of psychoneurosis was found to be significantly higher than the female rate.

Experience at the Home has shown that psychotherapy may be effective, even with persons in the seventh decade and beyond. Good results have been achieved even with patients suffering from chronic brain syndrome, in whom the symptoms often have been found to decrease with psychotherapy. It has been found, too, that the very dependency of old age may enhance the development of a good psychotherapeutic relationship. With many aged persons, it is possible to foster the illusion that all-embracing care and protection are continuously present. On the basis of this illusion, the aged person may show improvement.

The total psychiatric program now operating at the Home has permitted residents with mental disorders of a nature which would have previously required discharge to mental institutions, to continue in residence at the Home.

Rehabilitation efforts at the Home have proved to be of value. Individual physical retraining enables residents to care for themselves once again and to regain a sense of usefulness. When physical disability is added to existing emo-

tional disorder, or when emotional disorder accentuates bodily illness, the resources of the psychiatric department are employed with good effect. Proper adjustment to life at the Home is fostered, too, by opportunity for recreation and religious activity. Through this coordinated program, residents have been able to develop new courage and hope.

On July 1, 1952 the prevalence of coronary disease at the Home was 39.4 per 1000 (males, 72.7 per 1000; females, 20.6 per 1000), the prevalence of diabetes mellitus was 17.5 per 1000 (males, 18.2; females, 17.2), and the prevalence of hypertension was 107.3 per 1000 (males, 96.9; females, 113.2).

No published data were found with which the prevalence of coronary disease at the Home could be compared. The prevalence of diabetes at the Home was not significantly different from that found in Oxford, Massachusetts (17 per 1000), as reported by Wilkerson and Krall. No significant difference was noted when the prevalence of hypertension at the Home was compared with the prevalence of hypertension determined by Collins in a 1935–1936 survey of families in the United States.

Employing actuarial methods, the survivorship of residents with coronary disease, diabetes mellitus and hypertension was determined. Twenty-four per cent of the males and 26 per cent of the females with coronary disease survived for five years, and 11 per cent of the males and 7 per cent of the females survived ten years; 49 per cent of the males and 32 per cent of the females with diabetes mellitus survived five years, and 20 per cent of the males and 7 per cent of the females survived ten years; 28 per cent of the males with hypertension and 37 per cent of the females with hypertension survived five years, and 11 per cent of the males and 12 per cent of the females survived ten years.

It was found that the residents of the Home with the selected chronic diseases had lower survival rates than did all residents of the Home.

Residents of the Home suffering from hypertension were found to have a significantly higher five-year mortality rate (66 per cent) than that noted by Smithwick and Thompson (54 per cent). Although authoritative reasons for this difference cannot be offered, the use by Smithwick of a combined mortality rate for both sexes may be a contributing factor, by concealing any difference between the sexes.

The five-year and ten-year survival rates for residents of the Home with coronary disease were compared with the five-year survival rate (58 per cent) and the ten-year survival rate (37 per cent) recorded by Block and associates. The survival rates for the residents of the Home were found to be significantly lower. In general, differences noted were ascribed to comparison of populations differing in age (the average age at detection at the Home was 73 years; the corresponding mean age in Block's series was 58.8 years) and economic status (the residents of the Home were, in the main, destitute; Block's patients were able to pay for treatment at the Mayo Clinic).

The physical morbidity of 249 patients, whose mean age was 79.6 years (males, 80.7; females, 78.5), was studied. Four hundred and fifty-seven admission diagnoses were noted (1.8 per patient), and 1161 requests for medical care were made

by these residents (4.7 per patient) from the date of admission to the time of the survey.

The number of female admission diagnoses (1.6 per new entrant) was significantly lower than the number of male admission diagnoses (2.3 per new entrant). The nursing home population had 3.2 admission diagnoses per new entrant; the non-nursing home population had 1.2 such diagnoses per new entrant.

Study of the requests for medical care showed: 1) The number of female requests for medical care (4.4 per resident) was significantly lower than the number of male requests for medical care (5.3 per resident). 2) The number of requests for medical care by the non-nursing home population (3.8 per resident) was significantly lower than the comparable number of requests by the nursing home population (6.5 per patient).

These anticipated differences were due to the following factors: 1) Female applicants having had a more rigorous pre-admission screening than male applicants were, in general, a healthier group. 2) The nursing home population, being the sicker group, had more admission diagnoses and needed more care.

It was determined that 44 per cent of all the admission diagnoses were for diseases of the cardiopulmonary system; 18 per cent for diseases of the gastrointestinal tract; 10 per cent for diseases of the genito-urinary apparatus; and 7 per cent for diseases of the musculoskeletal system. The pattern for the requests for medical care differed, in that there were relatively large numbers of requests for medical care for diseases of the eye, ear, nose and throat, and skin.

The admission diagnoses were compared with diagnoses of chronic illness, in persons aged 65 years and over, noted in a survey of the Eastern Health District of Baltimore. Significantly higher rates were noted for cardiovascular disease (Home, 40 per cent; Eastern Health District, 50 per cent) and for arthritis (Home, 5 per cent; Eastern Health District, 20 per cent) in The Eastern Health District of Baltimore. These differences were probably due to the pre-admission screening of the applicants which tends to eliminate some of those with overt disease, and to the ability of the medical staff at the Home to arrive at more authoritative diagnoses with the aid of the diagnostic equipment available to them. No significant differences were noted on comparing the rates for such diseases and conditions as tuberculosis, diabetes, varicose veins and gallbladder disease. No comparisons were possible for such diseases as neoplasms, peptic ulcer, thyrotoxicosis or syphilis, because of gaps in the past medical and surgical histories of the residents, or because these diseases did not appear among the admission diagnoses at the Home.

Recommendations to the Home for Aged and Infirm Hebrews

1. Relax the rigid physical and mental entrance requirements and admit those in need of the care the Home provides, in order to meet the demands of the ever increasing numbers of chronically ill applicants.

2. Apportion space to meet the demand for beds, on the basis of the sex and physical status of the applicants. At present, space is not available in proportion to the demand for either sex or for those chronically ill. However, the situation is most serious in regard to the female applicants.

3. Convert Kingsbridge House to a facility for nursing home residents, since it would provide the most bed space and is the newest and most readily convertible unit of the Home.

4. Construct the projected 24-bed psychiatric unit at Kingsbridge House without undue delay. This should permit the retention in the Home of all but the most acutely disturbed psychotic patients. A full-time qualified psychiatrist should be attached to the unit.

5. Re-orient the basic emphasis of the medical care program at the Home from treatment to prevention. This will entail more frequent examinations of the residents (six-month intervals are suggested).

6. Employ a health educator whose functions would be to explain the principles of personal hygiene to the residents and work with the other departments of the Home to achieve an over-all understanding of the needs of the residents.

7. Encourage Staff physicians to revise death certificates in the light of autopsy protocols and other significant supplementary data.

8. Expand the Home Care program, at present reserved for those who are not in immediate need of institutionalization, as a means of relieving some of the pressures from applicants with chronic diseases.

9. Enlarge the Departments of Psychiatry and Physical Rehabilitation and extend their services to provide adequately for the home-care and non-nursing home population. If carried out, rehabilitation should serve to relieve some of the pressures for dormitory and infirmary beds.

CAPILLARY FRAGILITY IN OLDER PEOPLE. THE EVALUATION OF BIO-FLAVONOID THERAPY*

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INTRODUCTION

The important role which capillary dysfunction plays in many diseases is fully recognized by the medical profession, for it is in the capillary system that the essential exchange of body fluids takes place. Stefanini and Dameshek (1) stressed the fact that "the failure of the normal vascular factor of hemostasis may be due either to increased fragility or to increased permeability of the wall of the metarteriole or the capillary" and emphasized its significance in many hemorrhagic disorders. In cases of increased capillary fragility, there is often the capillary syndrome associated with diapedesis and capillary hemorrhage. This term was first introduced by Eppinger (2). The capillary vessel is composed of a fibrillary membrane, an endothelial layer, and a cement substance which unites the individual endothelial cells. "Spontaneous bleeding follows whenever there is any defect of the cement substance" assert Stefanini and Dameshek (1). Sokoloff and Eddy (3) and Puig-Muset (4) found that bio-flavonoids have a "binding" or "thickening" effect on the cement substance of the capillary wall, thus increasing its efficiency as a biologic filter.

Incidence of increased capillary fragility

Increased capillary fragility is a common phenomenon—much more frequent than has previously been recognized. Griffith *et al.* (5), Beardwood *et al.* (6), Rodriguez and Root (7), Greenblatt (8) and others reported an incidence of increased capillary fragility ranging from 20 per cent up to 78 per cent among subjects examined by them. Perry and Linden (9) found that increased capillary fragility is particularly high among older people. Mueller (10), Davis (11) and others, using capillary microscopy, found that increased capillary fragility was most common among patients affected with chronic diseases such as arteriosclerosis, hypertension, rheumatoid arthritis and diabetes. Capillary fragility is often associated with hypertension, but the figures of its incidence vary as given by different investigators, *e.g.*, 19 per cent by Griffith *et al.* (5) and 54 per cent by Beaser *et al.* (12). Diabetics also frequently manifest capillary fragility. According to Beaser *et al.* (12), 54 per cent of diabetics in general, and 100 per cent of hypertensive diabetics have capillary fragility of various degrees of gravity.

As Griffith and Lindauer (13) pointed out, all the data concerning the detection of capillary fragility cover its generalized stage. Actually, localized capillary fragility is much more frequent. The capillary syndrome may be localized in the

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brain tissue, the heart, or the lungs without evidence of generalized capillary fragility. The pathologic investigations of Paterson (14), Wartman (15) and others concerning capillary hemorrhage in the brain and the heart emphasize the frequency of localized injury to the capillary wall. In all bacterial infections, and in a great majority of viral infections, there is a localized capillary syndrome with diapedesis and capillary injury. "In inflammatory reactions caused by infection," stated Biskind and Martin (16), "there is invariably, involvement of the capillary circulation." In viral hepatitis (17, 18), poliomyelitis (19), smallpox (20, 21), measles (22, 23), primary atypical pneumonia (24), mumps (25), virus A influenza (26), St. Louis encephalitis (27), and other viral infections, capillary fragility and hemorrhage have been observed. Capillary dysfunction, localized or generalized, occurs in a multitude of conditions and is often overlooked in everyday practice, or dismissed lightly. Yet the capillary syndrome may complicate and aggravate any acute or chronic condition, particularly in older people.

Bio-flavonoids as capillary permeability factors

In 1936, Rusznyak and Szent-Györgyi (28) announced the discovery and isolation from paprika and lemon of a new substance, which they named vitamin P, or the capillary permeability factor. According to their experimental and clinical investigations, this factor influences capillary functioning, and arrests capillary hemorrhage. Soon they declared that vitamin P was not, as they had assumed, a single chemical substance, but a compound of four flavonoids. Following this discovery, extensive investigations conducted in this country with various flavonoids revealed that a clear distinction should be made between flavonoids, which are biologically inactive, and bio-flavonoids which are of therapeutic value in increased capillary fragility and capillary hemorrhage. In 1947, a bio-flavonoid compound was isolated from citrus pulp. It was chemically similar but not identical to the original vitamin P of Rusznyak and Szent-Györgyi (29). This compound, named C.V.P., was proved experimentally to possess considerable biologic activity (30, 31, 32). It was tested clinically in various conditions in which increased capillary fragility and capillary bleeding occurred. The therapeutic usefulness of this bio-flavonoid compound has been demonstrated in radiation erythema (32, 33), retinitis (34), bleeding duodenal ulcer (35), bleeding cystitis (36), erythroblastosis (37, 38), habitual abortion (39), tuberculous hemoptysis (40), hemorrhagic diatheses (41), otolaryngologic disorders (42, 43), periodontal diseases (44), and in increased capillary fragility in the aged (45). It also reduces the inflammation in bacterial and viral infections (16, 46-50).

In our present studies, we investigated the therapeutic usefulness of this bio-flavonoid compound (C.V.P.) in the diseases which often affect older people, and in which increased capillary fragility is the underlying etiologic factor, such as "little strokes," rheumatoid arthritis, retinitis and other ailments.

CLINICAL STUDY OF BIO-FLAVONOIDS

Method. The petechiometer is a simple and practical device for detecting changes in capillary fragility, and for evaluating the efficiency of therapeutic

TABLE 1

Capillary Fragility in Older People
Method of testing: petechiometer
Number of patients: 189

Condition	No. of Patients	Average Age (yrs.)	Increased Capillary Fragility (%)	Average Petechial Count*
Hypertension, non-diabetic; no cardiac involvement	80	62	72	16
Hypertension diabetic	25	58	100	33
Cerebral arteriosclerosis	15	69	67	18
Parkinson's disease	7	62.5	72	23
Hypertension with cardiac involvement or vascular disease	34	59	77	15
Multiple sclerosis	9	56	33.3	12
Miscellaneous (cancer, Little's disease, alcoholism, etc.)	19	60	25.5	11

* Only the patients with increased capillary fragility are included in this estimation of the petechiae index.

measures. Although affected by the complexities of biologic factors, the petechiometer, when used under similar conditions in the same patient, provides reliable results for comparative purposes. It is actually a resistometer which applies negative pressure over a small area of skin. It has the advantage over positive-pressure methods that multiple determinations can readily be made and different degrees of suction can be accurately reproduced.

Effect of bio-flavonoids on capillary fragility in elderly patients, with and without hypertension

Altogether, 189 patients were tested for capillary fragility, ranging in age from 53 to 88 years. When a negative pressure of 30 cm. of mercury was applied, 134 patients or about 64 per cent demonstrated increased capillary fragility (from 3 to 40 petechiae). In most of these cases, the fragility appeared to be generalized. There was no significant difference between the age group 60–70 and the age group 70–80 years; 60 per cent of the first group, and 66 per cent of the second group had increased capillary fragility.

The results of this investigation as presented in Table 1 indicate the frequency of increased capillary fragility among hypertensive patients. The highest incidence, 100 per cent, was observed in the hypertensive diabetics. Among the hypertensive patients with cardiac or vascular involvement, capillary fragility of various degrees occurred in 77 per cent; among the hypertensive subjects without serious cardiac involvement it occurred in 72 per cent. It is of interest that in 5 out of 7 patients with Parkinson's disease there was an injury to the capillary system; their respective ages were 66, 52, 59, 79, 56, 61 and 66 years, and the petechiae indexes were 0, 0, 18, 22, 26, 32 and 23.

Thirty patients with various degrees of capillary fragility were treated with bio-flavonoids,[1] two capsules, three times a day for a period of four weeks. Of

[1] C.V.P. manufactured by U. S. Vitamin Corporation of New York City.

TABLE 2

Effect of Bio-Flavonoids (C.V.P.) on Capillary Fragility

Patient	Age (yrs.)	Pre-treatment Petechiae Count*		Petechial Count After Administration of C.V.P.†				Change in Capillary Fragility
				For Two Weeks		For Four Weeks		
		Degree of negative skin pressure		Degree of negative skin pressure		Degree of negative skin pressure		
		20 cm.	30 cm.	20 cm.	30 cm.	20 cm.	30 cm.	
1. J.L.	72	0	20	0	15	0	9	Improved
2. P.W.	81	0	8	0	0	0	0	Restored to normal
3. R.T.	65	0	10	0	2	0	0	Restored to normal
4. W.C.	76	0	3	0	0	0	0	Restored to normal
5. F.A.	88	2	3	0	2	0	0	Restored to normal
6. G.B.	65	0	3	0	0	0	0	Restored to normal
7. E.S.	62	0	8	0	6	0	8	No change
8. D.R.	59	0	4	0	2	0	0	Restored to normal
9. E.B.	66	3	6	0	0	0	0	Restored to normal
10. L.T.	72	0	4	0	0	0	0	Restored to normal
11. K.K.	88	0	6	0	0	0	0	Restored to normal
12. S.Mc.	60	0	12	0	7	0	1	Restored to normal
13. H.L.	62	10	20	6	8	10	10	Improved
14. M.B.	60	0	8	0	4	0	0	Restored to normal
15. E.M.	65	6	12	0	5	0	0	Restored to normal
16. G.M.	64	0	4	0	2	0	0	Restored to normal
17. A.S.	65	0	16	0	10	0	0	Restored to normal
18. L.H.	72	2	32	0	25	0	2	Almost normal
19. S.B.	61	0	14	0	5	0	0	Restored to normal
20. P.K.	57	0	4	0	0	0	0	Restored to normal
21. H.S.	72	0	7	0	2	0	0	Restored to normal
22. D.H.	66	0	16	0	10	0	0	Restored to normal
23. A.X.C.	57	0	3	0	0	0	0	Restored to normal
24. V.J.	75	2	23	0	18	0	1–2	Almost normal
25. G.S.	71	0	12	0	9	0	0	Restored to normal
26. P.J.	57	0	16	0	12	0	0	Restored to normal
27. N.M.	70	0	8	0	3	0	0	Restored to normal
28. F.H.	63	0	6	0	2	0	0	Restored to normal
29. T.J.	69	2	23	0	18	0	1	Almost normal
30. M.B.	75	0	12	0	7	0	0	Restored to normal

* Petechiae count per unit area calculated after negative pressure (cm. of mercury) applied for one minute by the petechiometer.

† Six capsules daily.

these 30 subjects, 19 were hypertensive, and 11 had a normal blood pressure. Table 2 shows the results of the therapy. In 1 case there was no change; in 2 cases there was some improvement in capillary fragility. In the other 27 cases, capillary activity was restored to normal or almost to normal.

From these observations, it appears that bio-flavonoids administered for a period of four weeks have a beneficial effect on capillary dysfunction in older people.

Effect of bio-flavonoids in "little strokes"

Alvarez (51) considers "little strokes" to be one of the commonest diseases of aging man. These episodes over the course of years gradually pull patients down, as they represent dozens or scores of small hemorrhages from the capillaries and arterioles of the brain. Paterson (14), on the basis of his extensive pathologic investigations of the mechanism of apoplexy, concluded that "intimal hemorrhages in cerebral arteries result, not from backflow of blood through defects produced by rupture of atheromatous 'abscesses' as was previously thought, but from rupture of capillaries derived from the main arterial lumen." Increased fragility of the intimal capillaries is an underlying factor in cerebral hemorrhage. Adams (52) emphasizes the important role which the establishment of collateral circulation through the capillaries plays in recovery from apoplexy. According to him, the vascular-spasm theory of the mechanism of apoplexy is neither sound nor substantiated by pathologic findings (53). Hughes and Parkes (54) stress the fact that postmortem examinations of persons who died from the "little strokes" showed multiple foci of softening involving subcortical centers, including the *caudate nucleus* and *putamen*, in every case. These were always found in the region of the perforating arterioles and capillaries.

"Little strokes" affect mostly older people. The clinical pattern is characterized by frequent small strokes with transient or permanent paralysis and a tendency to the development of pseudobulbar palsy in the course of time. There are personality changes, emotional lability, and intellectual deterioration. These "little strokes" may be so very mild in nature at the onset of the illness as not to be recognized by the physician, according to Alvarez (51). In the great majority of the "little strokes" the blood pressure is elevated, often only moderately. The disease may be chronic, and has been known to last from fifteen months up to twenty years or more. It tends to run a more rapid course in males than in females. Those who survive may drift into dementia. However, serious cerebral damage is a rare complication and recovery is not excluded. The anticoagulants are of questionable value in the therapy of cerebral hemorrhage. According to a statement in the *Journal of the American Medical Association*, "certainly they are contraindicated in cases of cerebral hemorrhage, but even in cases in which typical cerebral thrombosis appears to be present, the use of anticoagulants has led to fatal intracerebral hemorrhage" (55). Russek *et al.* (56) recommend the use of cortisone in apoplectic stroke, and reported favorable results in 15 cases. Although immediate cortisone therapy may benefit apoplectic patients by improving their emotional and mental status, it has no effect on patients with cerebral hemorrhage, according to these investigators. Cortisone does not arrest capillary bleeding.

Accepting the biologic premise that capillary injury and capillary hemorrhage play an important role in "little strokes," we have treated this condition with bio-flavonoids. Altogether 13 cases have been under observation for a period from twelve months up to three years. C.V.P. was given in a dosage of 600 mg. or six capsules daily during the whole course of treatment. The findings are summarized in Table 3.

TABLE 3

Effect of Bio-Flavonoids on "Little Strokes"

Number of cases: 13

Dose: 600 mg. of bio-flavonoids, daily

Patient	Previous No. of "Little Strokes"	Duration of Observation	Results
Initials, Age, Sex			
A.L., 56, M	3	18 mos.	General condition improved. No stroke.
K.T., 63, M	4	22 mos.	Condition improved. No stroke.
V.H.J., 53, M	2	2 wks.	Died from cerebral thrombosis two wks. after the treatment was started.
G.N., 58, F	1	12 mos.	Condition good. No stroke.
H.R., 72, M	3	28 mos.	Condition satisfactory. No cerebral hemorrhage.
S.W., 71, F	2	12 mos.	Excellent condition. No stroke.
A.W., 75, M	3	2 mos.	Moved to another city. Some improvement.
T.F., 55, F	3	15 mos.	Condition satisfactory. No stroke.
G.N., 66, M	4	22 mos.	Condition satisfactory. No stroke.
H.L., 55, F	3	6 wks.	Moved to another city. Some improvement.
H.B., 69, M	1	32 mos.	Excellent. No stroke.
A.J.K., 77, M	2	22 mos.	Condition satisfactory. No stroke.
M.L., 54, M	4	16 mos.	Condition good. No stroke.

The results in this small number of patients seem to indicate a beneficial effect of bio-flavonoid therapy on the course of "little strokes." They emphasize as well, the important role which increased capillary fragility appears to play in this illness, and suggest more extensive studies along these lines.

Effect of bio-flavonoids in rheumatoid arthritis

Cortisone and its derivatives are still the choice of therapy with many physicians for rheumatoid arthritis. However, with older people who are often victims of this condition, cortisone should be used with considerable caution. It is known to increase blood pressure (57–59) and to induce states of hypercoagulability (60), thromboembolism (61), and peptic ulcer (62). It is contraindicated in renal and cardiovascular insufficiency, peptic ulcer, infectious arthritis, diabetes mellitus and certain infectious diseases, according to Ward (63). Cortisone and its derivatives seem to lower resistance to infectious diseases, particularly if of viral origin (64, 65).

In rheumatoid arthritis, the capillary syndrome is usually present in the affected joints. Marked diapedesis and an increased volume of synovial fluid are associated with abnormalities in the walls of the capillaries and arterioles. From a pathologic point of view, there are many indications that in rheumatoid arthritis there is increased capillary fragility, localized in the joints. This observation led us to the investigation of the effect of bio-flavonoids on rheumatoid arthritis.

During the last six years, 45 cases of this disease were treated with bio-flavonoid compound for periods ranging from three months up to three years.[2] The

[2] Many of these case histories were supplied by Dr. James R. West, Morrell Memorial Hospital, Lakeland, Florida.

age of the patients ranged from 50 to 79 years. In some cases, the daily dose of bio-flavonoids was 300 mg.; in the rest, 600 mg. The latter dose seems to be more effective therapeutically. The cases of long duration responded less favorably than those which were more recent. The treated patients were divided into four groups, as shown in Table 4.

Bio-flavonoid therapy does not produce a dramatic effect in rheumatoid arthritis, such as is often observed in patients treated with cortisone and its derivatives. In cases of long duration, the clinical improvement is slight or nil; but in cases of short duration, the response is more favorable.

The following case history is typical in this respect:

N.K., a white newspaperman, age 58, had moderate hypertension with a B.P. of 165/90. He was susceptible to colds and infections, but there was no cardiac involvement. In March 1952, he had pain in both shoulders. His temperature at that time was 102°F., and he had swelling and redness of the fingers.

Admission examination on October 5, 1952, revealed a temperature of 101°F., spindle-shaped fingers, considerable swelling of the metacarpophalangeal joints with limitation of motion, and swelling and tenderness of both shoulders. The patient was given cortisone with dramatic results—relief of symptoms and a sharp decrease in swelling. The daily dose of cortisone was 75 mg. for a period of thirty-eight days.

In November 1952 a new attack occurred. The temperature went up to 103°F. and pain and swelling returned. Corticotropin was prescribed, 75 mg. daily. The results were less dramatic than with the first treatment. His temperature went down, swelling subsided partially, but was still evident, and pain was still present. Corticotropin was continued for another five months, during which time his temperature was normal. Pain and swelling remained, however, and motion was limited.

TABLE 4

Effect of Bio-Flavonoids on Rheumatoid Arthritis

(45 cases)

Groups	Avge. Duration of Disease (yrs.)	Avge. Duration of Therapy*	Results:	
			Clinical	Subjective
Group 1: 12 cases	13	6 mos.	Slight improvement in 6 cases; no improvement in 6.	Pain decreased; sense of well-being.
Group 2: 16 cases	6	1 yr.	Improvement in 10 cases; slight improvement in 3; no improvement in 3.	Pain decreased; general well-being.
Group 3: 8 cases	3	2 yrs.	Marked improvement in 4 cases; some improvement in 2; slight in 2.	Pain decreased; claimed sense of well-being.
Group 4: 9 cases	1½	2 yrs.	Marked improvement in 6 cases; some improvement in 2; no improvement in 1.	All claimed sense of well-being.

* In Group 1, the daily administered dose was 300 mg. in 9 cases. The rest of the patients in Group 1 and those in Groups 2, 3 and 4 received 600 mg. for eight weeks, with an interruption of four weeks; then the therapy was again applied for the rest of the treated period. Bio-flavonoids are nontoxic and can be used without any harmful effects for many months in a dosage much larger than 600 mg. daily.

In April 1953 the patient showed the signs of cortical dysfunction, and purpura. Corticotropin was discontinued and bio-flavonoid therapy (C.V.P.) was started in a dosage of 2 capsules three times daily. Five days later, this dosage was increased to 2 capsules, four times daily.

Examination on May 13, 1953, revealed the skin almost free from petechiae and purpura spots. The temperature remained normal. Swelling persisted, but pain was decreased. Contracture deformity of the hands was 3 ×; the knees were swollen; the joints of the right hand were 1 × and of the left hand, 2 ×. Bio-flavonoids were continued in a dosage of 2 capsules four times daily.

Examination on July 6, 1953: Temperature was normal. Pain had subsided, and stiffness was decreasing. Mobility of the hands and fingers had increased. Swelling of the ankles was reduced by about 20 per cent. The general condition was satisfactory. The dosage of bioflavonoids was reduced to 2 capsules three times daily.

Examination on December 10, 1953 showed absence of swelling in the ankles, and higher mobility of fingers. The patient complained of occasional pain. Bio-flavonoids were continued in a dosage of 2 capsules three times daily.

Examination on May 13, 1954: The condition of the patient was satisfactory. There was no swelling. Pain in the shoulders was only occasional, and there was greater mobility. Bioflavonoids were continued in a dosage of 2 capsules three times daily.

The patient was last seen in May 1955. There was no swelling of the joints and mobility was the same as on the previous examination. There was occasional pain. The blood pressure was 148/85. The general condition was good. Continuation of bio-flavonoids was recommended.

Our clinical investigation on bio-flavonoids in rheumatoid arthritis seems to indicate their therapeutic usefulness in this condition. They can be recommended as a supplement to other methods of treatment in rheumatic arthritis.

Effect of bio-flavonoids in retinitis

Retinitis is a frequent complication of diabetes and hypertension in older people. Retinal hemorrhages and exudates of various degrees are always associated with retinitis. The hemorrhages may be small and few in number; they may be severe but still isolated; or they may be numerous and associated with white spots, and extending into the vitreous. There seems to be no doubt (6) that in all cases of retinopathy the direct cause of hemorrhage is injury to the capillary wall.

In the course of our clinical investigations, and in cooperation with several ophthalmologists, 198 cases of retinopathy, mostly in older people, were treated with bio-flavonoids alone or in combination with lipotropic factors.[3] In 85 per cent of the cases of diabetic and hypertensive retinopathy the hemorrhages were promptly controlled and rapidly absorbed. No new hemorrhagic areas were observed (34).

The course of the retinopathy in the following case of hypertensive retinitis is typical:

S.P., a white man aged 59, was highly myopic and had worn glasses since adolescence. In 1951, visual black spots appeared. He was not taking any medication. On March 5, 1953, there was sudden loss of vision in the right eye. During the next seven days, he noticed that

[3] Most of these cases were treated by Dr. Walter R. Loewe, Department of Ophthalmology, New York City Hospital.

his vision was becoming steadily worse, causing discomfort at work. He was examined on March 12, 1953.

Examination: In the fundus of the eye was a well defined subretinal flame-shaped hemorrhage just above the macula. The retinal vascularization was typical of a moderately advanced arteriosclerosis. The arterioles appeared to be small in caliber and showed varying degrees of arteriospasm. There was an arterio-venous nicking in the area of hemorrhage and slight edema. There were no other areas of hemorrhage and no area of exudation or of atrophy. Intraocular tension (Schiotz) was normal in both eyes. The blood pressure was 180/100.

Diagnosis: Hypertensive retinopathy, Stage 3.

Progress: Bio-flavonoids (C.V.P.) were started in a dosage of 2 capsules three times daily. When examined four weeks later, on April 10, there were no new hemorrhages and there was a decrease in the size of the macular hemorrhagic spot. It appeared less flame-shaped. The medication was continued for the next nine months, and the patient was examined once a month. Examination on July 15 showed a complete resorption of the macular hemorrhage. No new hemorrhages were noticed. The arterioles appeared less spastic. Vitreous opacities were still present but were smaller and fewer. The blood pressure was 150/90. The general condition was satisfactory. Examination on January 4, 1954, showed that the improvement had been maintained. There were no new hemorrhages. Intraocular tension was normal. The blood pressure was 155/92.

Effect of bio-flavonoids in epistaxis

Bleeding from the nose is not an uncommon phenomenon in hypertensive older people, particularly when there is a viral or bacterial infection and fever is present. Harmless as it may be by itself, epistaxis is always an indication of increased capillary fragility and deserves prompt attention on the part of a physician.

Among 45 patients with epistaxis observed by us, 30 had increased capillary fragility when checked with the petechiometer. The petechial index was high (up to 35–37) in the majority of these cases. Seven aged patients suffering from virus influenza had severe epistaxis; 4 of them were hypertensive and 3 had normal blood pressure. Their ages were 65, 72, 73, 54, 77, 72, and 65 respectively. All of them received intensive bio-flavonoid therapy in the form of C.V.P., three capsules every four hours, or 1.5 grams per day. Epistaxis was arrested, often within thirty-six hours. These clinical trials furnished additional supporting evidence of the effectiveness of bio-flavonoids in capillary fragility.

DISCUSSION

If we accept the vital role which the integrity of the capillary system plays in maintaining normal hemostasis, as emphasized by Stefanini and Dameshek (1), then we cannot but agree that the capillary syndrome in chronic diseases deserves the full attention of the medical profession. Its etiologic significance is much greater than has previously been recognized. Our failure in combating many chronic diseases in the elderly may have been due in part to our having overlooked the capillary dysfunction which almost always is present in these conditions. The essential processes of the circulation of the blood, the exchange of body fluids and nutrients, and the regulation of cellular and tissue dynamics all take place within and through the capillaries and depend upon their integrity.

The clinical studies reported here demonstrate the beneficial effect of bio-

flavonoids on increased capillary fragility and the capillary syndrome, and in certain chronic diseases which beset aging man, such as "little strokes," rheumatoid arthritis and retinitis.

One major disease which claims the largest number of deaths among older people, coronary thrombosis, was left out of our investigation. Yet even in this disease, capillary impairment undoubtedly is a contributing etiologic factor. The pathologic investigations of Wartman (66), Winternitz (67) and Paterson (68) demonstrated that hemorrhage from intimal capillaries of the cardiac arteries is the actual cause of the thrombus. Paterson (14) prepared serial sections of the areas of occlusion taken from the hearts of 58 patients after death from coronary thrombosis. In 52 cases, or 89 per cent, he found an intimal hemorrhage at the site of the thrombus formation. He stressed the fact that intimal capillaries which originate from the lumen of large arteries are more "fragile" than the terminal capillaries, and are easily ruptured. The resulting hemorrhage may cause sudden death, or, if the hemorrhage is moderate, formation of a blood clot and coronary occlusion. Thus it has been demonstrated by the pathologic studies of these investigators that intimal bleeding from *vasa vasorum* is one of the factors involved in the mechanism of coronary occlusion or of sudden death from hemorrhage.

In older people an attempt should be made to control and to improve the function of cardiac capillaries in cases of cardiac involvement which might lead to sudden death or to coronary occlusion.

SUMMARY

In 189 subjects ranging in age from 50 to 88 years capillary fragility was measured, using the negative pressure method (petechiometer). Among these, 134 subjects (about 64 per cent) manifested increased capillary fragility.

Thirty elderly patients with various degrees of capillary fragility were treated with bio-flavonoids (C.V.P.) for four weeks. The integrity of the capillary system was restored in all but 3 cases.

Thirteen patients with a previous record of two or more "little strokes" were treated with bio-flavonoids for periods ranging from twelve months to three years. In 10 cases there was no further occurrence of "little strokes" during the bio-flavonoid treatment.

Forty-five patients affected with rheumatoid arthritis received bio-flavonoids for varying periods. Those in whom the disease was of long duration responded poorly to this therapy. Some clinical improvement was observed in about 50 per cent of the cases of short duration.

One hundred and ninety-eight cases of retinitis (diabetic and hypertensive) were treated with bio-flavonoids alone, or combined with lipotropic factors. There was prompt control and rapid absorption of the hemorrhage in 85 per cent of the cases.

Forty-five cases of epistaxis in older people responded favorably to bio-flavonoids.

The possible role of intimal capillary hemorrhage in coronary thrombosis has been discussed.

REFERENCES

1. Stefanini, M., and Dameshek, W.: The Hemorrhagic Disorders. New York, Grune & Stratton, 1955, p. 48.
2. Eppinger, H.: Über Permeabilitätsänderungen im Kapillarbereiche, *Verhandl. d. deutsch. Gesellsch. f. Kreislaufforsch.* (11th) 166, 1938.
3. Sokoloff, B., and Eddy, W. H.: Bio-Flavonoids in Capillary Fragility. Monograph, Series 2, Capillary Fragility and Stress. Lakeland, Fla., Florida Southern College Press, 1952.
4. Puig-Muset, R.: Introductional Estudio de la Vitamin P. Barcelona, Univ. Press, 1945.
5. Griffith, J. Q., Jr.; Krewson, C. F., and Naghiki, J.: Rutin and Related Flavonoids. Easton, Pa., Mack Publishing Company, 1955, pp. 67–95.
6. Beardwood, J. T.; Roberts, E., and Trueman, R.: Observations on the effect of rutin and hespiridin in diabetic retinitis, *Proc. Am. Diabetes A.* **8:** 243, 1948.
7. Rodriquez, N., and Root, H.: Capillary fragility and diabetic retinitis, *New England J. Med.* **238:** 391, 1944.
8. Greenblatt, R. B.: Habitual abortion; possible role of vitamin P in therapy, *Obst. & Gynec.* **2:** 530, 1953.
9. Perry, D. J., and Linden, L.: Capillary fragility in older people, *Science Newsletter*, April, 1953.
10. Mueller, O.: Die feinsten Blutgefässe des Menschen in gesunden und kranken Tagen. Stuttgart, F. Enke, 2 vols. 1937 and 1939.
11. Davis, Eli: Capillary microscopy, with special reference to capillary petechiae, *Am. J. M. Sc.* **212:** 192, 1946.
12. Beaser, S. B.; Rudy, A., and Seligman, A. M.: Capillary fragility in relation to diabetes mellitus, hypertension and age, *Arch. Int. Med.* **73:** 18, 1944.
13. Griffith, J. Q., and Lindauer, M. A.: Increased capillary fragility in hypertension, *Am. Heart J.* **28:** 758, 1944.
14. Paterson, J. C.: Some factors in the causation of intimal hemorrhages and in the precipitation of coronary thrombi, *Canad. M. A. J.* **44:** 114, 1941.
15. Wartman, W. B.: Occlusion of coronary arteries by hemorrhage into their walls, *Am. Heart J.* **15:** 459, 1938.
16. Biskind, M. S., and Martin, W. C.: The use of citrus flavonoids in respiratory infections, *Am. J. Dig. Dis.* **21:** 177, 1954.
17. Lyon, E.: The capillary syndrome in viral disease, *Cardiologia* **24:** 143, 1954.
18. Lucke, B., and Mallory, T.: The fulminant form of epidemic hepatitis, *Am. J. Path.* **22:** 867, 1946.
19. Bodian, D., and Howe, H. A.: Neurotropism and the genesis of cerebral lesions in polio myelitis: an experimental study, *Bull. Johns Hopkins Hosp.* **68:** 58, 1941.
20. Wolman, E.: Pathologic findings in hemorrhagic smallpox, *Am. J. Clin. Path.* **21:** 1127, 1951.
21. Svertson, S. E., and Hyman, I. B.: Edema in smallpox, *U. S. Armed Forces M. J.* **3:** 1777, 1951.
22. Miller, A. A.: Purpura in the course of measles, *Brit. J. Child. Dis.* **38:** 1, 1941.
23. Rake, G.: Measles, *in* Viral and Rickettsial Infections of Man, edited by T. M. Rivers. Philadelphia, J. B. Lippincott Company, (ed. 2) 1952, pp. 479–480.
24. Horsfall, F. L.: Primary atypical pneumonia, *Ibid.* pp. 385–386.
25. Enders, J. F.: Mumps, *Ibid.* p. 515.
26. Brightman, I. J.: Recovery of a filtrable virus from children with influenza, *Am. J. Dis. Child.* **52:** 78, 1936.
27. Olitzky, P. E.: Viral encephalitides, *in* Viral and Rickettsial Infections of Man, edited by T. M. Rivers. Philadelphia, J. B. Lippincott Company, (ed. 2) 1952, pp. 221–226.
28. Rusznyak, S., and Szent-Györgyi, A.: Vitamin P: flavonols as vitamins, *Nature* (London) **138:** 27, 1936.

29. Sokoloff, B., and Redd, J. B.: Study on Vitamin 'P': Monograph, Series 1. Lakeland, Fla., Florida Southern College Press, 1949.
30. Sokoloff, B.; Eddy, W. H., and Redd, J. B.: The biological activity of a flavonoid (vitamin 'P') compound, *J. Clin. Invest.* **30:** 395, 1951.
31. Arons, I.; Freeman, J., and Oppenheim, A.: Experimental and clinical studies on flavonoids in malignancy, *Cancer Res.* **11:** 234, 1951.
32. Arons, I., Freeman, J., and Weintraub, S.: Bio-flavonoids in radiation injury, *Brit. J. Radiol.* **27:** 696, 1954.
33. Martin, W. P.: Bio-flavonoids—A new drug improving cancer radiation therapy, Proc. Meeting, Buffalo Gen. Hosp., Buffalo, N. Y., May, 1952.
34. Loewe, W. R.: Physiological control of certain retinopathies, *Eye, Ear, Nose & Throat Monthly* **34:** 108, 1955.
35. Weiss, S.; Weiss, J., and Weiss, B.: Gastro-intestinal hemorrhagia. Therapeutic evaluation of bio-flavonoids, *Am. J. Gastroenterol.* **24:** 112, 1955.
36. Saelhof, C. C.: The capillary syndrome in hemorrhagic cystitis. Therapeutic evaluation of bio-flavonoids, *Am. J. Dig. Dis.* **22:** 204, 1955.
37. Rogers, G. C., and Fleming, J. M.: Therapeutic evaluation of citrus bio-flavonoids in the prevention of erythroblastosis, *West. J. Surg.* **63:** 386, 1955.
38. Jacobs, W. M.: The use of the bioflavonoid compounds in the prevention or reduction in severity of erythroblastosis fetalis, *Surg., Gynec. & Obst.* **102:** 233, 1956.
39. Taylor, F. A.: Habitual abortion. Therapeutic evaluation of citrus bioflavonoids. Report on twenty-five cases, *West. J. Surg.* **64:** 280, 1956.
40. Jones, L. W., and Croce, P.: Clinical studies on C.V.P. in Tuberculous Hemoptysis. Monograph, Series 3, Capillary Fragility and Stress. Lakeland, Fla., Florida Southern College Press, 1952, pp. 19–21.
41. Sokoloff, B., and Eddy, W. H.: Bio-Flavonoids in Capillary Fragility. Monograph, Series 3, Capillary Fragility and Stress. Lakeland, Fla., Florida Southern College Press, 1952, pp. 23–26.
42. Goldman, H. B.: The clinical application of bio-flavonoids in otolaryngology, *Eye, Ear, Nose & Throat Monthly* **35:** 246, 1955.
43. Scal, J. C.: Epistaxis: treatment with a new citrus flavonoid compound combined with vitamin K, *Eye, Ear, Nose & Throat Monthly* **35:** 246, 1955.
44. Wellensiek, E. K.: Therapeutic evaluation of bio-flavonoids in periodontal disease, *Texas Dental J.* **74:** 289, 1956.
45. Martin, W. C.: Treatment of capillary fragility with soluble citrus bio-flavonoids complex, *Internat. Rec. & Gen. Pract. Clin.* **168:** 66, 1955.
46. Finch, F. L.: The therapeutic value of citrus bio-flavonoids in upper respiratory infections, *Tri-State Med. J.* **3:** 45, 1956.
47. Biskind, M. S., and Martin, W. C.: The use of citrus flavonoids in infections. II, *Am. J. Dig. Dis.* **22:** 41, 1955.
48. Sokoloff, B.: The capillary syndrome in viral infections: treatment with citrus flavonoids, *Am. J. Dig. Dis.* **22:** 7, 1955.
49. Sokoloff, B.; Biskind, M. S.; Martin, W. C., and Saelhof, C. C.: On the therapeutic uses of citrus bio-flavonoids, *Clin. Med.* **2:** 787, 1955.
50. Wentworth, E. T., Jr: Bioflavonoids and the common cold, *Clin. Med.* **3:** 1085, 1956.
51. Alvarez, W. C.: The little strokes, *J. A. M. A.* **157:** 1199, 1955.
52. Adams, R. D.: Mechanism of apoplexy as determined by clinical and pathological correlation, *J. Neuropath. & Exper. Neurol.* **13:** 1, 1954.
53. Editorial. The mechanism of apoplexy, *J. A. M. A.* **155:** 578, 1954.
54. Hughes, E. G., and Parkes, M. W.: *in* Jubilee Volume dedicated to Emil Christoph Barell. Basle, Switzerland, Frederick Reinhardt, Ltd. Co., 1946, p. 216.
55. Cerebral hemorrhage (Queries & Minor Notes), *J. A. M. A.* **155:** 90, 1954.
56. Russek, H. I.; Russek, A. S., and Zohman, B. L.: Cortisone in immediate therapy of apoplectic stroke, *J. A. M. A.* **159:** 2, 1955.

57. Cecil, R. L., and Kammerer, W. H.: The treatment and management of chronic arthritis, *New York Med.* **6** (8): 16, 1950.
58. Lewi, W. G.: Re ACTH and cortisone, *Clin. Med.* **57:** 170, 1950.
59. Loxton, G.: Recent advances in the treatment of rheumatoid arthritis, *Post Grad. M. J.* **26:** 447, 1950.
60. Cosgriff, S. W.; Dielenbach, A. F., and Vogt, W., Jr.: Hypercoagulability of the blood associated with ACTH and cortisone therapy, *Am. J. Med.* **9:** 752, 1950.
61. Shick, R. M.; Baggenstoss, A. H.; Fuller, B. F., and Polley, H. F.: Effect of cortisone and ACTH on periarteritis nodosa and cranial arthritis, *Proc. Staff Meet., Mayo Clin.* **25:** 492, 1950.
62. Bollet, A. J.; Black, R., and Bunim, J. J.: Major undesirable side-effects resulting from prednisolone and prednisone, *J. A. M. A.* **158:** 459, 1955.
63. Ward, L. E.: Precautions in the use of cortisone for treatment of rheumatic diseases, *Minnesota Med.* **38:** 304 (May) 1955.
64. Dougherty, J. W.; Reisch, M., and Lewis, G. M.: Lowered resistance to infection resulting from cortisone and corticotropin, *New York J. Med.* **54:** 2964, 1954.
65. Jacobs, J. H., and Rose, F. C.: Pneumonia occurring during ACTH and cortisone therapy, *Tubercle* **36:** 113, 1955.
66. Wartman, W. B.: Occlusion of coronary arteries by hemorrhage into their walls, *Am. Heart J.* **15:** 459, 1938.
67. Winternitz, M. D.; Thomas, R. M., and LeCompte, P. M.: The Biology of Arteriosclerosis. Springfield, Illinois, Charles C Thomas, Publisher, 1938.
68. Paterson, J. C.: Capillary rupture with intimal hemorrhage in causation of cerebral vascular lesions, *Arch. Path.* **29:** 345, 1940.

PSYCHOSIS IN THE AGED*

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During the recent years, with the advances in geriatrics, there has been a re-examination of diagnostic and therapeutic attitudes toward the aged. Great progress has been made with the non-mental illnesses, but the study of psychosis in the aged continues under the influence of many of the older prejudices. The purpose of this paper is: 1) to present two factors which overly influence the diagnosis of psychosis in the aged; 2) to discuss a new consideration as to the etiology of "senile psychosis"; 3) to include a diagnostic formulation which will allow for a more undestandable therapeutic approach; and 4) to present a clear-cut diagnostic summary of the more common psychiatric syndromes found in the aged.

TWO FACTORS INFLUENCING DIAGNOSIS

In 1952 the Medical Infirm Building of the Veterans Administration Hospital, Fort Douglas, Utah was activated. During the evaluation of patients for the complete rehabilitation program, a review of the diagnoses was made. Nineteen patients had been admitted with the diagnosis of chronic brain syndrome associated with cerebral arteriosclerosis or associated with senile brain disease. *In 14 of these, re-diagnosis was necessary*, as shown in Table 1. A more complete discussion of most of the cases is given throughout this paper. The following case is typical of those in which the diagnosis had to be changed:

Case 1

E.B.C. (#825), a 58-year-old white man was transferred to Fort Douglas on October 11, 1953. The diagnosis was far advanced right pulmonary tuberculosis and chronic brain syndrome associated with cerebral arteriosclerosis with psychotic reaction.

The past history revealed that in 1936 the patient was treated for pneumonia, in 1939 for an abscess of the left jaw, in 1940 for pneumonia, and in 1947 for a fractured pelvis. On February 16, 1949, he was hospitalized for pulmonary disease, which was diagnosed as a lung abscess. A right lower lobectomy was performed on April 12, 1949. Hospital discharge was on January 24, 1950. The patient was followed closely until May 1, 1951.

On May 1, 1951, at the age of 56, he was hospitalized because of mental confusion and irritability. Hospitalization continued until August 7, 1951, during which time he manifested silly laughter, bizarre behavior, temper tantrums, poor reasoning and judgment, and vague paranoid ideas. The discharge diagnosis was psychosis, unclassified. Following

* The ideas expressed in this paper are the opinion of the writer, and do not necessarily reflect the opinion of the Veterans Administration.

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TABLE 1

Patient	Admitting Diagnosis	Diagnosis Changed to:
E.A.S., #1048, Case 14 in text	Chronic brain syndrome assoc. with senile brain disease	Acute brain syndrome assoc. with teeth extraction
H.G.H., #408 Case 15	Chronic brain syndrome assoc. with senile brain disease	Acute brain syndrome assoc. with sedation
R.S.J., #535, Case 5	Chronic brain syndrome assoc. with cerebral arteriosclerosis	Chronic brain syndrome assoc. with encephalitis
H.G., #407, Case 6	Chronic brain syndrome assoc. with senile brain disease	Chronic brain syndrome assoc. with cerebral atrophy
W.M.S., #1051	Chronic brain syndrome assoc. with senile brain disease	Chronic brain syndrome assoc. with cerebral atrophy
G.W.H., #834, Case 8	Chronic brain syndrome assoc. with senile brain disease	Schizophrenic reaction, paranoid type
J.L.T., #130	Chronic brain syndrome assoc. with senile brain disease	Chronic brain syndrome assoc. with alcoholic intoxication
C.M.J., #1060, Case 13	Chronic brain syndrome assoc. with cerebral arteriosclerosis	Acute brain syndrome assoc. with pneumonitis and malnutrition
R.W.B., #549	Chronic brain syndrome assoc. with cerebral arteriosclerosis	Schizophrenic reaction, paranoid type
C.B., #612, Case 2	Chronic brain syndrome assoc. with cerebral arteriosclerosis	Sociopathic personality disturbance, antisocial reaction, chronic brain syndrome assoc. with alcoholic intoxication
P.V.M., #978	Chronic brain syndrome assoc. with cerebral arteriosclerosis	Chronic brain syndrome assoc. with alcoholic intoxication
E.B.C., #825, Case 1	Chronic brain syndrome assoc. with cerebral arteriosclerosis	Schizophrenic reaction, simple type
S.O., #1316, Case 3	Chronic brain syndrome assoc. with senile brain disease	Personality pattern disturbance; inadequate personality
H.A.G., #376	Chronic brain syndrome assoc. with cerebral arteriosclerosis	Personality pattern disturbance; inadequate personality

discharge, the patient was described as always appearing silly, and was rather disoriented as to place. On September 11, 1953, at the age of 58, he was rehospitalized because of an acute upset, at which time he threatened an associate with a knife. Because of aggressive behavior, the patient was secluded. During this time he completely tore up his bed and had bowel movements on the floor, which he smeared on the walls and windows. Gradually this disturbed and destructive behavior receded and be became withdrawn, uncommunicative and depressed. On September 16, 1953, the patient was seen in psychiatric consultation. The impression was "possible schizophrenic reaction, chronic, undifferentiated type." Further diagnostic evaluation was not made and the patient was transferred for investigation of his pulmonary disease. He carried the label of cerebral arteriosclerosis, despite psychiatric opinion. Following complete evaluation at Fort Douglas, the diagnosis was changed to schizophrenic reaction, simple type.

This case illustrates a diagnostic approach which is frequently used when the physician is confronted with an aged psychotic patient. Any irrational episode after the age of 55 is supposed to be due to cerebral arteriosclerosis or senility. This is not true.

A diagnosis once made, should not be allowed to remain without periodic review. The following case is an example of this fault:

Case 2

C.B. (#612), a 63-year-old single white man was transferred to Fort Douglas on July 24, 1953, with the diagnosis of chronic brain syndrome associated with cerebral arteriosclerosis. He had been committed to the transferring institution on March 27, 1945, after having been picked up by the police for drunkenness. During his hospital stay he was found to be very talkative and grandiose with delusions of persecution. There were no hallucinations. There was loss of memory for remote events. He was well oriented but lacked judgment and insight. He was not considered psychotic and showed very few signs of deterioration. Findings on physical examination were essentially within normal limits.

Following transfer to Fort Douglas, the patient's past history was obtained. It was learned that there had been emotional difficulty dating back to World War I. When hospitalized in 1923 the diagnosis was neurasthenia with service-connection because of nervousness, insomnia and inability to work. From 1923 until 1934 the patient was undependable, drank constantly whenever money was available, could not maintain a job, never paid his bills and borrowed as much money as he could. He had been jailed many times during this period for alcoholism. In the meantime, cirrhosis of the liver developed and there were numerous periods of malnutrition and avitaminosis. He received a psychiatric evaluation in 1934 and his diagnosis was changed to constitutional psychopath, inadequate personality and chronic alcoholism. From 1934 until his final admission there were several additional hospitalizations for malnutrition associated with alcoholism.

At Fort Douglas the patient continued to manifest delusions of persecution, complete lack of judgment and insight, good orientation for time, person and place, adequate affect, and very little intellectual deterioration. The diagnosis was changed to sociopathic personality disturbance, antisocial reaction and chronic brain syndrome associated with alcoholic intoxication.

When the diagnosis of cerebral arteriosclerosis was made, no consideration had been given to the patient's history. Nothing pointed to cerebral arteriosclerosis, except age. The history of repeated episodes of alcoholic overindulgence with secondary avitaminosis and liver disease was ignored. During the eight years of hospitalization, no serious review had been made of the diagnosis.

The determination of psychosis in an elderly person leans heavily upon the attitude of the persons in the environment. Too frequently the diagnosis of psychosis is correlated with the intolerance of this environmental personnel to the patient's behavior. What in one area may be considered intolerable, is in another tolerable. It is this *tolerance factor* which is converting State mental hospitals into homes for the aged, and converting the "normal" aged into the "psychotic" aged. The intolerance of a particular environment may force a label of cerebral arteriosclerosis or senility in order to facilitate hospitalization. The following is an example:

Case 3

S.O. (#1316) a 58-year-old white bachelor was admitted to Fort Douglas on August 10, 1954, with a diagnosis of chronic brain syndrome associated with senile brain disease. This admission followed a great deal of correspondence between the hospital and the family.

For many years the patient had lived by himself, working either as a turkey farmer or a sheepherder in the hills of Utah. His adjustment to society was adequate for essentials.

Upon examination at the hospital, the patient was not psychotic. Apparently his admission resulted from his sister-in-law's concern over his living conditions and diet, which she considered inadequate according to her standards. She felt that his personal hygiene was deficient. Review of his C-file revealed that he had been discharged medically from service during World War I with a diagnosis of inadequate personality. Following this discharge, he spent most of his life doing odd jobs. The findings on physical examination were not remarkable, and there was no evidence of malnourishment. Results of psychologic testing confirmed the lack of psychosis and the presence of an inadequate personality.

During the patient's hospital stay he presented no problems. He realized the conflict with his sister-in-law, and felt that her values had no place in his living. He was subsequently discharged with the diagnosis of inadequate personality.

The original diagnosis was one of convenience to insure hospitalization of an older person.

Two points are stressed: 1) The diagnoses, chronic brain syndrome associated with cerebral arteriosclerosis or associated with senile brain disease, are made too frequently in the older age group *irrespective of the clinical picture*, and too much weight is given to the *age* of the patient. 2) These diagnoses are often used to relieve an intolerable situation in a particular environment when it involves an older person.

ETIOLOGY OF "SENILE PSYCHOSIS"

With the increase in longevity there has developed a reorientation to the process called aging. A popular consideration is that aging is the term which designates a time interval—the term applied to the mere passing of time. Associated with aging are a variety of degenerative changes which are pathologic. As a result of these pathologic processes, the individual deteriorates, ending in the state of senility. Thus, associated with the *normal* process of aging are a variety of *abnormal* degenerative changes, also called senile, which produce the abnormal features characterizing the later years or the state of senility.

At present there exists no correlation between the pathologic findings in the brain and the existence or lack of existence of "senile psychosis" (1). The pathologist cannot state whether a patient was or was not psychotic during life. The senile plaque cannot be blamed as *the* factor in producing "senile psychosis."

In reviewing the histories of patients manifesting the findings of "senile psychosis," one wonders whether this syndrome might not be caused by the accumulated emotional trauma of living and thereby be a functional disease. During the last war it was well demonstrated that if a "normal" individual were subjected to enough emotional stress, he would have a psychotic break. It would seem that if a "normal" individual were subjected to enough emotional stress, incurred over a period of time, this too could precipitate a psychotic break. Thus, as accumulating somatic traumata can cause somatic senility, accumulating mental traumata can cause mental senility. It is this end-condition which one might term *pure senile psychosis*. It represents the mental reaction on the part of the individual to the accumulated emotional traumata of living. Pure senile psychosis represents pathologic emotional aging.

In the aging individual, characteristics develop which frequently have been

described as the "normal" mental changes associated with aging. Actually, they are degenerative in character and result from reaction to accumulating trauma. They further prevent adjustment to environmental changes. The aging person becomes more rigid, and thus there is an additional factor in vulnerability, each continually adding to the other. Characteristically, these factors begin to manifest themselves between the ages of 50 and 70 and become superimposed upon the adult personality pattern. In the meantime, this pattern is accentuated during the passage from adulthood to senesence. It is further sharpened at senility. Thus, from a mental viewpoint, the person who is becoming senile is one who, in reacting to the emotional traumata of life, finally accumulates an overload of inefficient responses. All of this is superimposed upon his basic personality pattern, made bare by the later years. This progresses to a state of decompensation which can be called "senile psychosis." Such a state is not a regression to infantile responses, the so-called second childhood, but rather a further development by the individual of responses which in our present cultural pattern are not accepted.

A textbook description of the progression of events in the building of the total picture might be as follows: Early there is the easy development of mental fatigue, with a decrease in efficiency and speed of the various mental abilities. Adjustment to this decline is possible by greater effort, but gradually there is a further decline. Later, both the ability to concentrate and the ability for abstract thought decrease. The patient recognizes these inadequacies. With the realization of the loss in the mental and physical sphere, he will complain and make attempts to compensate. Anxiety develops upon recognition of these inadequacies. There is decreased initiative, because of fear of failure. A further attempt in self-maintenance is the patient's attempt to use all available influences to uphold himself as the center of attention. There is a continual rejection of anything that might cause him to be of secondary importance; he maintains himself at the expense of all others. In order to prove his superiority, he becomes very talkative. This garrulousness must refer to events of importance to him, and thus there is a great concern with the past. He points out the insignificance of today as compared to yesterday. Since only he spans both eras, only he can judge! By stressing events and activities of the past, he emphasizes his egocentricity. When anyone attempts to belittle his ideas, he retorts with an argument. This fear of being disproved makes him carry a chip on his shoulder. He is easily drawn into a quarrel. Obstinacy is a further feature of egocentricity. With the overconcern for the importance of the self, he finds it hard to give. Therefore he becomes obstinate in order to preserve his ego and to emphasize his correctness in contradistinction to the correctness of others. As further attempts are made to point out errors or to dissuade him from a selected activity, he becomes irritable.

With further loss of mental efficiency, there is a gradual restriction in the patient's interest. This is manifested by a decrease in interest span and time. There is associated difficulty in catching his attention. When interest is held, frequently he will show an overconcern with irrelevances. He finds it difficult to

see the forest because of the trees. Gradually there is a further decrease in all intellectual functions, and an associated decrease in mental grasp.

Loss of memory is usually considered to be a characteristic of old age, more specifically loss of memory for recent events—a sort of absentmindedness. This is partially true. The loss of memory associated with the "degeneration" of aging is correlated with emotional tone, recentness of the memory image, and the importance that the memory image holds for the patient. Very frequently when a recent item is forgotten, it means that its emotional tone was negative, that there was not much fixation, or that it was of relative unimportance. Loss of memory in the aged is often no different from repression of memory images in youth. Items that have been "forgotten," under proper conditions, can be brought back. This can be demonstrated by means of stress interviews, sodium-amytal interviews or during pleasant or unpleasant environmental situations. Too frequently "I don't remember" is accepted during the mental-status interview, when the spending of a little more time would unearth the answer. The following case is typical:

Case 4

G.W.L. (#1453), a 75-year-old white married man, was admitted to Fort Douglas on October 20, 1954. The diagnosis was chronic brain syndrome associated with senile brain disease.

The onset of the patient's difficulty dated back to 1946, when he worked as a janitor. Initially he manifested mild confusion with associated slowness in mental calculation. Gradually he began to show decreased concern for the feelings and attitudes of others. He would drive his car, completely oblivious of the traffic and pedestrians. In 1950, at the age of 70, he was retired from his job. His mental status continued in the same manner and his associates felt that they were the idiosyncracies of an old man. In the spring of 1953, the patient stopped recognizing his wife, although he was able to get around the city, use the buses, visit friends, recognize acquaintances and continue with his outside-of-the-home routines. He was admitted to Fort Douglas after he began to make threats against "that woman" who was living with him.

During hospitalization he continued to deny being married. Finally a stress interview was set up. The patient had worked for many years as a private detective, and by using police interview techniques, he finally "confessed." At this time he gave a complete history of his marriage, and the details closely followed those stated by his wife, including much of the friction during the forty years of marriage.

There is more to the loss of memory than the time of origin of the memory image. The repressed memory image is the result of three factors: emotional tone, importance, and time of development. It is essential to recognize that memory loss associated with organic brain disease may also be functional. The fact that there is organic brain disease does not assure the examiner that the memory loss is due to this condition. In questioning any patient, stopping immediately when the answer is "I don't remember" will prevent many mistakes. The following case demonstrates this point:

Case 5

R.S.J. (#535), a 58-year-old white married man was transferred to Fort Douglas on June 24, 1953, with a diagnosis of chronic brain syndrome associated with cerebral arteriosclerosis.

The history dated back to 1949 when the patient began to complain of fatigue. This continued for four weeks and ended in a "cold." The latter was present for two weeks, at the end of which time the patient became very lethargic. On the third day of the lethargy, a headache developed, and he took a nap for relief. One hour later his wife found him in coma. He would awaken and mumble, on painful stimulation. His pulse was 50, and blood pressure was 100/50. There was generalized hyporeflexia with no abnormal physical or neurologic findings. During his initial twenty-two hours of hospitalization, the patient slept but would respond to stimulation. Results of a spinal tap on the day after onset, the following day, and four days later were all within normal limits. On admission the white blood cell count was normal, but on the following day it was 15,800 with 79 per cent polymorphs, 27 per cent lymphocytes and 3 per cent monocytes. During the patient's hospitalization he was incontinent of urine, responded rationally when spoken to, maintained good color and displayed spontaneously periods of irrationality. He remained in the hospital for one and a half months, during most of which time he slept. At the time of discharge, he was emotionally labile, with spells of crying and laughing. There was complete amnesia for the entire past life. The patient remained at home for a year, during which time he slept a great deal. Memory for recent and remote events was totally impaired.

When the patient was seen at Fort Douglas, it was felt that his history was more consistent with the diagnosis of chronic brain syndrome associated with encephalitis. To date there have been no abnormal physical findings. He remains in good physical condition, and there is no evidence or past history of any disease that might have produced a cerebrovascular accident. His impaired mental status persists, characterized by emotional lability, intellectual deterioration and delusions. On superficial examination, there is apparent complete memory loss, but repeated questioning discloses that the patient *has* good memory recall. It would seem that he finds it to be too much trouble and that it requires too much energy to recall memories. As a result he has established the pattern of answering: "I don't know," or "I can't remember"—answers which have been acceptable to the examining physicians.

Memory loss associated with the "degeneration" of aging may be functional in origin, reflecting emotional tone, and feelings of importance and impression rather than relating entirely to time. Similarly, memory loss in organic brain disease can be functional, as a reflection of the same factors.

As the individual become more inefficient, he becomes more concerned and worries more over this gradual deterioration. This concern is not only regarding mental loss, but also regarding the obvious physical inadequacies. These anxieties pile up and manifest themselves as hypochondriacal complaints. Such complaints frequently draw attention to the patient. This leads to depression and a bemoaning of his fate. Associated with the depression is an increasing restlessness because of the inability to maintain himself. There is further progression to overt anxiety. The patient sees his external environment falling away and he further isolates himself and tries to pull in his forces. The personality becomes more rigid and the habits more fixed. He begins to exercise poor judgment. Flattery on the part of a stranger easily sways him into foolish deeds. He loses insight, with resultant misinterpretation of all activities. Family conversations, which he has difficulty hearing because of auditory loss, are built into delusions of persecution. If accused of decreased attention and forgetting, he labels them as falsehoods. Poor visual ability allows for further misinterpretations. This accumulation makes for additional emotional instability. Whom can he trust? Where are his old friends? He is crying one minute because of his isolation, and suspicious the next because of the obvious "goings-on."

As time passes, the patient feels that since society will not accept him, then he will not accept society. His ethical attitudes change. This can lead to alcoholism. Later there is a lack of concern over physical appearance, and he becomes untidy. Then a total indifference to social courtesies appears. This rejection on the part of society and his lack of trust are expressed as hoarding and overconcern for his personal items. As his fear of robbery increases, he becomes easily agitated. Still later, there is continual agitation because of the further instability of the environment. As reality slips away, he fears for his status in the community. In men, this is frequently focused on a concern over manliness. Society has equated manliness with sexual ability. Opportunity for proof of the latter may not be available because of the death of a spouse. He attempts outside sexual activity, and not infrequently with children. To prove his ability further, attempts are made with a variety of sexual practices. As his anxiety grows worse, his attempts are generally unsuccessful.

The old person becomes less alert. He takes afternoon naps. Later this develops into a reversion in the sleep cycle. Unable to sleep at night, he gets out of bed; darkness obscures all familiar sights and he becomes confused. Later the confusion persists into the day. This gradually develops into disorientation—at first for time, later for place, and finally for person. The confusion interferes with the family's ability to handle his excreta and consequently there is incontinence of urine and stool.

In this manner the aging person accumulates the emotional trauma of living. This gradual emotional scarring decreases his efficiency in handling psychologic stimuli. He slowly enters a state of mental decompensation, a true *presbyphrenia*.

DIAGNOSTIC FORMULATION

The causes of disability in the elderly are multiple. More than one pathologic process contributes to the diseases which are secondary to aging. In somatic illnesses, attempts are made to delimit each pathologic process in order to determine its contribution to the total picture and then, through treatment, to modify this influence. There should be the same approach to geriatric psychosis. No one agent is the cause. Psychosis in the aged can be the result of a variety of factors.

Factor I. Brain Pathology (BP)

Anatomic, biochemical and physiologic changes in the substance of the brain can cause psychotic behavior. Factor I represents actual organic change in the brain and/or local changes in the brain due to disease elsewhere in the body. Included are such conditions as intracranial infections, drug intoxications, cerebral trauma, circulatory disturbances, abnormal metabolism or nutrition, systemic infections, arteriosclerosis, neoplasms, pneumonia, renal failure, or avitaminosis. This group represents any detrimental influence upon the anatomic, biochemical or physiologic mechanisms of the brain, as the result of an intra- or extra-cranial agent.

Factor II. Emotional Response to Organic and Functional Changes and Diseases of Aging (ER)

This factor results from the patient's emotional reaction to his own mental and/or physical changes which are secondary to the deterioration and degeneration associated with aging. Examples of this are the response to loss of beauty, decrease in hearing, loss of the ability to make rapid mental calculations, greyness of hair, or wrinkling of skin. Factor II manifests itself as the reaction to the person's recognition that he is becoming or has become old.

Factor III. Degree of Abnormality of the Underlying Personality (DA)

This factor represents the amount of deviation from "normal" that the adult personality pattern presents at the time of entrance into senesence.

Factor IV. Degree of Interpersonal Conflict (IC)

Factor IV represents the conflict produced by the individual being aged and the environment's response to this agedness, *i.e.*, the individual's reaction to society's rejection or acceptance of his being old. These conflicts relate to such things as lack of work, lack of responsibility, loss of status, loss of family, lack of contribution, death of spouse, family intolerance, change in living environment, or loss of security.

Factor V. Accumulated Emotional Traumata of Living (ET)

This factor represents the infinite number of injuries to emotional structure during the later years. It represents the same stresses and strains that persons in all age groups undergo from nonspecific agents. These stresses and strains are not related to being old, but to being alive.

Extent of Psychosis

Each of the foregoing five factors contributes to the mental status of the aged patient. It is the summation of these factors which determines the extent of mental disease in the aged. Thus:

$$BP + ER + DA + IC + ET = \text{Extent of Psychosis in the Aged Patient.}$$

Each factor contributes its percentage of abnormality to the mental structure of the subject. When the weight of abnormality overbalances the tolerance factor of a particular environment, the case is diagnosed as psychosis and the patient is institutionalized. Use of this five-factor formulation allows one to understand: 1) the lack of correlation between senile plaques and "senile psychosis"; 2) why one patient with cerebral thrombosis becomes psychotic, whereas the other with a similar thrombosis continues to engage actively in business; 3) why one senile patient is labeled paranoid and the other deteriorated; 4) why there are elderly schizophrenics; and 5) why there are varying patterns in paresis.

The formulation is of most value from a therapeutic standpoint. It should be kept foremost in mind when the history relative to the mental disability is

elicited. Too many histories center around information concerning the event precipitating the admission. Generally not too much time is spent in unraveling the sequence of mental and physical changes and the agents which produced these changes. Every attempt should be made to record the full historical development of the disability. When this is done, there will be unfolded a clear picture which permits appraisal of the percentage contribution of each of the five gross factors; then, in each of the five categories, the more specific etiologic factors may be ascertained. In this way, it is possible to pinpoint the contributing factors and then to approach treatment realistically. Nicotinic acid given to a person who is depressed because of society's rejection is doomed to failure. Psychotherapy in a brain that is riddled with holes resulting from thrombi is doomed to failure. Drainage of a brain abscess in a patient who was on the verge of a schizophrenic break will not result in a normal individual. Each factor contributes to the psychosis and only a knowledge of the extent of the contribution will permit intelligent treatment.

In order to present more clearly the five-factor formulation, 5 cases are cited. Each is an example of mental disease in the aged. Each case was selected to demonstrate the large proportion contributed by an individual factor in the production of the psychotic state. It must be remembered that this factor was *not* the sole contributor. Had the other factors contributed less, then the major factor would have contributed more.

Case 6. Brain Pathology

H.G. (#407), a 60-year-old white married man was transferred to Fort Douglas on April 27, 1953, with the diagnosis of chronic brain syndrome associated with senile brain disease.

The onset of the patient's mental difficulty was in 1947 at the age of 54. It began with forgetfulness. In the same year, the patient's daughter gave birth to a child with one arm missing. Soon afterward the patient began to complain of people following him and talking about him. His loss of memory became worse, activity was slowed, and he lost interest in things. These gradually became more severe, along with the development of disorientation for time and place and inability to write his name. He had auditory and visual hallucinations. On July 8, 1952, he was admitted to a hospital because of continued regression and deterioration. He had become antagonistic toward his wife, refused to co-operate, insisted upon remaining out-of-doors, and would stand motionless for hours. A diagnosis of senility was made and he was transferred to a mental hospital. There he was found to be disoriented, confused, unco-operative, having visual hallucinations and not recognizing any members of his family.

At the time of transfer to Fort Douglas, the picture had not changed. The patient had hallucinations concerning farm animals, doing farm chores, crossing streams, chasing pigs and the like. He showed perseveration of sentences, words and syllables. In conversation, he would perseverate nonsense syllables. A pneumoencephalogram obtained on January 9, 1955, revealed findings consistent with diffuse brain atrophy. Throughout his entire hospital course the patient demonstrated no abnormal neurologic findings.

Case 7. Emotional Response to Aging

C.C.W., a 73-year-old white married man was seen in January 1955. The admission diagnosis was cerebral arteriosclerosis. The family was concerned over the patient's loss of memory. He would wander around the house confused, and seemed to be gradually growing worse.

The first remark of the patient when he was ushered into the examining room was: "Gosh, it's great to be healthy," and with this, he suddenly flexed his biceps and his face lighted up with a broad smile. His memory loss seemed to be related to certain aspects of his life. He could not remember his birth date, his present age, his marriage anniversary, the number of children he had, their birth dates, or apparently any factor which might indicate his age. He was a farmer and remembered very well his produce of last year, the names of his neighbors, the President of the United States, and the number of states in the union.

Discussion with his wife brought forth the information that never in their forty-five years of marriage had she ever heard her husband mention old age. His thoughts never touched on retiring. He was always happy and cheerful, always laughing. Rarely was he without a smile. He seemed to enjoy life to its fullest. She dated the onset of his difficulty to March 1954. At that time the patient had begun to have a great deal of trouble with his teeth. As a result, he sought dental consultation. In conversation with the dentist, the patient was told that he was getting old and would have to have all his teeth extracted and dentures made. Two days later the patient began manifesting the mental changes. The post-extraction course was normal, with no indication of any complication. During the period of progressive development of the mental changes, there were periods when the patient seemed to be perfectly normal. Then, for no apparent reason, the confusion and memory loss would appear. Physical examination revealed nothing which might cause the mental symptomatology. The patient continued to show the periodic clearing of the sensorium.

Case 8. Abnormality of the Underlying Personality

G.W.H. (#834), an 88-year-old white male bachelor was transferred to Fort Douglas on October 15, 1953, with the diagnosis of chronic brain syndrome associated with senile brain disease.

On August 1, 1952, at the age of 86, the patient had been committed to a mental hospital because of his attempts to kill his neighbors and because he lived with fifteen to twenty dogs. He was passive and had delusions about owning large amounts of property. After some weeks of being institutionalized, he eloped by climbing a high fence and swimming a river.

The patient had spent most of his life living alone in a rural area, either farming or prospecting. He was considered queer by his neighbors and his family, and kept himself isolated.

Periodically, during his hospitalization at Fort Douglas, he would enter into trance-like states and gaze off at a distant window. When questioned concerning this, the patient would describe his guardian angel. She was female, with blonde hair, 5 feet, 5 inches in height, and dressed in modern clothes except for being bare from the waist up. She wore tennis shoes. She had been associated with him for many years. Other times he would describe the 7th Cavalry surrounding Salt Lake City preparing to rescue him. His mother was the Empress of France, as was his grandmother, and he claimed both to be living. They too were making preparations to have him released from the hospital.

Psychologic testing revealed some organic deficit, but in the main the findings were consistent with the diagnosis of schizophrenic reaction, paranoid type.

Physiologically, this patient was younger than his chronologic years. He was active on the ward and presented no physical problem. There was no disorientation as to time, person or place, and no confusion. Most of his difficulty was in the sphere of bizarre delusional ideas relative to his importance, to his great wealth, and to his guardian angel.

Case 9. Degree of Interpersonal Conflict

F.L.P. (#1613), a 70-year-old white married man was admitted to Fort Douglas on January 12, 1955. He could no longer be maintained at home. He had become confused and irritable, showed periodic disorientation, and had sudden outbursts of anger.

The wife dated the onset of the patient's difficulty back to the age of 62. At that time he

was the general manager of a large firm in a foreign country. He was a college graduate and had been exceptionally capable and did important war work during the last two conflicts. At the age of 62 he began to manifest concern about his retirement at the age of 65. During this period he kept talking about retirement and kept telling his wife that he was becoming too old. Because of the latter, he stopped making any attempt to remember things, so that familiar routines became unfamiliar. He stopped remembering areas in the vicinity of his work and minor details associated with his work. With each episode, he would remark: "Well, I'm getting too old." At age 64 he was brought back to this country to spend his last year in the front office. After six months of doing nothing except trying to find something to do, his firm paid him off for the remaining six months and released him. He purchased a home in a state bordering on Utah. He incessantly sought work, any form of work. Each time, he was reminded of his age. Gradually he began to regress.

At the time of admission to Fort Douglas, the patient was found to be in fairly good physical condition. He could be considered ten years younger than his chronologic age. He was oriented to time, person and place. Authoritarianism seemed to disturb him. At one time he had been considered to be an excellent amateur photographer. When the ward physician attempted to interest the patient in his camera, the response was negative. The same attempt was made by the ward nurse, and he explained to her the many intricacies of a Leica camera. He continued to rebel against authoritarian persons, but remained co-operative with other ward personnel.

Case 10. Accumulated Emotional Traumata

I.S.D., an 80-year-old white married woman, was seen in October 1953 because of developing senility.

I had first seen the patient in Feburary 1953, while examining her husband. At that time she was capable, and maintained a home for her husband. Throughout her life she had been awed by him and completely subservient to his demands. The husband had to be institutionalized in May 1953. In order to ease things for their mother, the children placed her in a rest home. During the first two weeks of June 1953, the patient became confused and disoriented. This cleared immediately when she was returned to her own home. She was then placed in a second rest home, with the same results. During September 1953, she was moved to her widowed daughter-in-law's home and improved mentally, but did not regain her previous status. At this time I was asked to see her, and noted that in a period of six months she had undergone a moderate amount of regression. She continued at this residence until February 1954, when she fractured her left hip. She was hospitalized for one week during the pinning of the hip. For this week the patient was completely confused, disoriented and out of contact. Most of the time was spent in squealing and yelling. As a result, she was returned to her daughter-in-law. There was a return toward normalcy, but not to the status prior to the fracture. Because of the lack of adequate nursing care, the patient was hospitalized at a different hospital. There for two weeks she repeated the activity of the first hospitalization. Periodically the patient lost complete contact with reality. Some of these episodes resulted from a recurring cystitis. Both the abnormal behavior and the cystitis cleared under antibiotic therapy. Other episodes of complete psychotic behavior could not be accounted for at that time.

In September 1954, the patient was moved to a third rest home. Here again she became completely unmanageable. Finally the family was forced to move her. A fourth rest home was found and she was moved in late October 1954. The owner of this home had ability in handling the aged and was able to develop rapport with the patient. During her stay her mental condition was the best since the fracture of her hip. In this period the son was building an addition to his home with all the conveniences for the handling of an infirm person.

In January 1955, she returned to her son's home. Here she again began manifesting periodic confusional states. They related directly to the patient's wants. She apparently used them to escape from a hostile environment whenever there was a conflict between her son

and his wife, or children. She used them to get the family to abide by her desires. In general, they reflected her attempt to control the interpersonal relations of those about her.

In summary, the patient's course was one of an elderly person who gradually had been developing mental decompensation. Acute periods were directly related to either emotional or physical traumata. With each episode, the patient had not been able to make a full return to her former mental status. Each incident inflicted another degree of inefficiency, so that complete and absolute return was not possible.

Each of the foregoing histories reveals a major contribution by a single factor. This is not always the case; in many patients there are equal contributions by several factors. If, upon discovery of a single factor it can be successfully overcome, the mental changes will disappear. Thus, should future investigations confirm that a great deal of the mental disability in the aged is the result of an emotional response to the discovery of growing old, preventive measures can be instigated during the earlier years.

From a therapeutic standpoint, determining the role of these factors in the production of a psychotic episode in an aged patient permits one to approach the treatment with a definite goal in mind.

COMMON PSYCHIATRIC SYNDROMES

The opening portion of this paper discussed the frequency with which two diagnoses are made in aged mental patients, namely, chronic brain syndrome associated with cerebral arteriosclerosis or associated with senile brain disease. The diagnosis of any disease entity depends upon certain findings, in the absence of which the diagnosis cannot be made. This holds true for the aged psychotic patient. There must be a minimum of findings. If the latter do not exist, the diagnosis *cannot* be made, and should not be made in an arbitrary manner. Rather than misdiagnose, it is preferable not to diagnose.

The following are discussions of three diseases which are most commonly observed in aged mental patients:

Chronic Brain Syndrome Associated with Cerebral Arteriosclerosis

Alvarez (2) has well described this frequent clinical syndrome as "little strokes."

Symptomatology in normotensive individuals results from atherosclerotic involvement of the large arteries of the brain. In the hypertensive subject there are usually additional hyperplastic changes in the smaller arteries of the deeper substance of the brain (3). Thrombi form, giving rise to secondary areas of infarction. No dependable correlation exists between cerebral atherosclerosis and systemic atherosclerosis. Diagnosis will depend upon the history and findings relative to involvement of the brain; no great reliance can be placed upon funduscopic changes, electrocardiographic changes, increased pulse pressure, renal dysfunction or pipestem arteries in the extremities.

The fact that there are mental changes in an individual over the age of 50 does not mean that they are atherosclerotic in origin. Age is only one point in the diagnostic score, not the determining factor. This syndrome has a rather

specific diagnostic picture, but enough information must exist to make the diagnosis. It should not be made simply because of the lack of other available diagnoses. Should the minimum picture not be present, the case should remain undiagnosed, and the lesion be only suspected.

The characteristic of this disease is sudden change in behavior. The course is stepwise downward with minimal reversion back to normal. Each step usually is heralded by sudden clouding of consciousness, sudden confusion, vertigo, fainting, a convulsive seizure, a typical stroke, or any disability producing significant cerebral anoxia. Transient or permanent neurologic changes can be demonstrated. There may or may not be changes in the spinal fluid. The electroencephalogram will show abnormalities if obtained frequently enough during the early course, but may not show any abnormalities after a period of time. With each attack there is progressive dementia, decrease in intellectual ability, development of gaps in memory, perseveration, disorientation, the baring of the basic personality pattern. With each attack another piece of brain is removed. A characteristic remark of the family is that since the attack, the patient just does not seem to be the same; his personality has changed. The patient may complain of dizziness, buzzing in the head, visual or auditory aura, and unreality of the world.

The foregoing description applies to the syndrome as most frequently found. Undoubtedly there is a group of patients whose course is one of gradual change secondary to gradual blood-vessel obliteration. This condition closely simulates senile brain disease. The patient may show no evidence of neurologic change or only a very gradual development of tremor. It is in this group that the etiologic differentiation is most difficult, or impossible. This situation will continue to exist until our diagnostic facilities have been increased. In order to insure the accuracy of new diagnostic methods, it is imperative that they be tested against accurately diagnosed cases. The use of the foregoing diagnostic approach for the diagnosis of chronic brain syndrome associated with cerebral arteriosclerosis will assure a greater percentage of accuracy. Some patients will have to be placed in a suspected group until opinion is more certain. Generally, with a period of watchful waiting, the differentiation is made.

Case 11. D.B.W. (#1329), a 54-year-old white bachelor was transferred to Fort Douglas on August 18, 1954, with the diagnosis of chronic brain syndrome associated with cerebral arteriosclerosis.

On February 15, 1954, the patient was hospitalized because of the development of sudden weakness, nausea, vomiting and paresthesias of the left side of the face, left arm and leg. Blood pressure was 160/120. On examination, his mental status was good. There was flatness of the left side of the face and some weakness of the left leg. He seemed to make a good recovery and was being considered for discharge, when on March 12, 1954, he became drowsy and confused. Hoffman's sign was present bilaterally. On the left were an increased ankle reflex with clonus, and a questionable Babinski sign. He then became agitated, and more confused, inattentive and drowsy. On April 28, 1954, he was aggressive physically and had to be restrained and transferred to a psychiatric hospital. Here examination revealed a grossly confused person who perseverated. There was impairment of concentration and retention. The cranial nerves were intact. There were the following neurologic manifestations: Hoffman's sign (bilateral); hyperactivity of the deep tendon reflexes of the upper

extremities; hyperactive left ankle reflex with clonus; and a questionable Babinski sign on the left.

Following transfer to Fort Douglas the patient's mental status remained the same. Neurologic signs consisted of a questionable right Babinski sign. Hoffman's sign was absent, and tendon and ankle reflexes were normal throughout. The superficial abdominal reflexes were absent but the cremasteric reflexes were present. The admitting diagnosis of chronic brain syndrome associated with cerebral arteriosclerosis continued.

It must be remembered that even though there are fainting spells with personality changes, the diagnosis can be other than a condition due to cerebral arteriosclerosis. A complete history must be obtained and the evaluation made on the basis of the complete history. The following case emphasizes the importance of this point:

Case 12. H.A.G. (#376), a 58-year-old white married man was transferred to Fort Douglas on April 15, 1953, with the diagnosis of chronic brain syndrome associated with cerebral arteriosclerosis.

The history which accompanied the patient revealed that he had been hospitalized during June 1945 for emotional instability, depression and thoughts of self-depreciation. In 1948 he had begun to have delusions of persecution, with moody spells. During February 1949 he was rehospitalized for "passing-out spells" present during the previous six years, mental clouding with episodes of crying, tinnitus, vertigo and staggering gait. He was hospitalized again during May 1949 for delusions of persecution, suspiciousness, expressions of unworthiness and uselessness of life, confusion, disorientation and memory defects. His case was diagnosed as cerebral arteriosclerosis. At that time he was found to have heart disease. He had refused to talk, would not eat and remained isolated. He was rehospitalized during February 1950 for depression, fatigue and fainting spells. A diagnosis of chronic brain syndrome associated with cerebral arteriosclerosis was made, and he was transferred to a mental hospital. There he remained, manifesting the same activity until transfer to Fort Douglas.

Work-up at Fort Douglas revealed the same behavior pattern. Most of the time the patient refused to talk and held no communication with anyone. He would sit upright in his chair, staring straight ahead. Upon persistent questioning he would reply with pertinent and logical answers. He complained of not feeling well, of generalized aches and pains and would cry during any discussion of his physical status. Additional history disclosed that he was a bed wetter until the age of 12. At puberty he had nightmares and would walk in his sleep. The onset of his mental difficulty dated back to 1933, at the age of 42, when he began to worry about his farm. He insisted that people were stealing his feed. He had delusions of his fences being torn down. He began to have numerous somatic complaints.

In April 1935 he was institutionalized for the foregoing difficulties. He was rehospitalized in April 1936; the diagnosis was hysteria. At this time most of his complaints centered about the abdomen. He was again hospitalized in March 1938; the diagnosis was constitutional psychopath with an inadequate personality. He was rehospitalized in March 1940 and in March 1941 for many somatic complaints. According to the patient's wife, he always underestimated his ability and never felt that he was capable. There was never any evidence of neurologic changes. His fainting spells were discovered to be sudden episodes of severe cyanosis from the neckline up. He had polycythemia and clubbed fingers. The opinion was that he was not psychotic, but severely neurotic with a basic inadequate personality. No findings were consistent with the diagnosis of cerebral arteriosclerosis.

On January 20, 1955, following a severe cyanotic episode, the patient died. Postmortem examination revealed a pulmonary thrombus as the cause of death, secondary acute cor pulmonale, and chronic cor pulmonale. On examination of the brain, practically no arteriosclerotic involvement of the blood vessels could be detected. The psychiatric diagnosis was personality pattern disturbance; inadequate personality.

Acute Brain Syndrome

The acute brain syndrome is the result of organic disease which upsets the fine homeostatic balance found in many of the aged. The internal environment is subjected to just enough trauma to upset it and the patient slips into a psychotic state. This syndrome is precipitated by organic changes, and if they can be eliminated before permanent change occurs, the patient can be returned to his pre-psychotic state. This is the importance of recognizing this syndrome. These patients can be "cured" of their psychosis with treatment directed to the acute disease.

The syndrome is characterized by sudden development of disorientation, confusion, lethargy, hallucinations, bizarre behavior and/or personality changes in previously mentally-well aged persons. The cause can be minor in nature, *e.g.*, a cold, cystitis, mild dehydration, or a major disease entity. The acute brain syndrome can superimpose itself upon chronic brain syndrome and increase the severity of the latter.

The pith of management is the immediate recognition of the condition and its eradication with adequate treatment.

Case 13. C.M.J. (#1060), a white 85-year-old man was transferred to Fort Douglas on March 9, 1954, with the diagnosis of chronic brain syndrome associated with cerebral arteriosclerosis.

On February 15, 1954, the patient was admitted to another hospital with a history of having been living alone in a trailer court. A neighbor stated that the patient had become irrational, erratic in his behavior and forgetful, and they feared that he might be harmed if he wandered away. The patient had been seen by a local physician who found him in coma and had him hospitalized. He was unresponsive when admitted to the first hospital. About twenty minutes after admission he was found sitting in a chair about six feet away from his bed, unaware of his surroundings. He refused to acknowledge anyone at that time. Later in the day he refused to have anything to do with the physicians because he was a Christian Scientist. Physical examination revealed no acute pathologic changes. In a chest roentgenogram taken the day after admission, the findings were consistent with pneumonitis. Following this, rusty sputum was noted. Penicillin was then started. The pneumonitis responded, but the mental confusion persisted. He was then transferred to Fort Douglas.

On admission, the foregoing physical findings were present. His mental status continued as described. His transfer occurred on March 9, 1954. On March 11, 1954, the patient was found sitting in a wheel chair reading a magazine. He was oriented regarding time, place and person. His memory for the period of hospitalization was spotty, but memory prior to that was good. He was not considered to be psychotic at this time, and he begged forgiveness for any acts that were ungentlemanly. From March 11, 1954, he continued to be competent until April 19, 1954, when he complained of chest pain and had a temperature of 103°F. X-ray examination at this time revealed an area of pulmonary infiltration which responded to penicillin. During this second period of pneumonitis, the patient again manifested confusion and activities identical with those at the time of his admission.

Review of the patient's C-file revealed that in 1926, at the age of 57, he suddenly became greatly concerned about religion. He began to have delusions of persecution and claimed he heard God. He refused to eat and became mute. This resulted in admission to a hospital, where he remained in a "hypnotic trance." A few days later he returned to his normal behavior.

Psychologic testing at Fort Douglas revealed a person who had a rigid personality but was well oriented and not psychotic. The patient was discharged with the diagnosis of acute brain syndrome associated with pneumonitis and malnutrition.

Case 14. E.A.S. (# 1048), an 83-year-old widower was admitted to Fort Douglas on March 8, 1954, with the diagnosis of chronic brain syndrome associated with senile brain disease. At the time of admission he was negativistic, his speech was slow but coherent, and he was depressed. He was oriented as to time and person. He seemed to be having auditory hallucinations, and there was paranoid ideation relative to poisoning.

The onset of the patient's difficulty was on February 17, 1954. Prior to that he had been living with his family. He was very alert, spending about fourteen hours a day reading. He was considered an authority on Indian lore, western plants and bird life. His physical condition was considered good and he had done a great deal of hiking the previous autumn. On February 17, 1954, the patient had all of his teeth extracted. The following day he became irrational, had hallucinations, displayed bizarre behavior, kept talking about being half celestial and half mortal, prayed constantly, talked about being persecuted by friends who were possessed of the devil, attempted to strike people with any object he could get his hands on, barricaded himself and refused to wash. On March 1, 1954, he was admitted to a private hospital where he was confined to a padded cell, wearing only his underwear, not allowed to wear his glasses, and given only milk to drink. The family was told that the patient was beyond help and electric shock was suggested, with only a 60–40 chance of responding. The family had the patient transferred to Fort Douglas.

Following admission the patient was given a regular diet, and treatment consisted of reassurance. On March 22, 1954, the patient had become a great deal more co-operative, was eating well, and sleeping without medication. He gradually returned to his normal state and on April 24, 1954, went on a two-week leave of absence with his family. He did not return to the hospital, and was maintained at home. His diagnosis was acute brain syndrome associated with teeth extraction.

Case 15. H.G.H. (# 408), a 74-year-old white bachelor was transferred to Fort Douglas on April 27, 1953, with the diagnosis of chronic brain syndrome associated with senile brain disease.

On April 6, 1951, the patient was hospitalized because of painful feet. He was found to have syphilis, which was considered to be latent because no sign of activity could be found. The painful feet gradually became worse and involved the legs, hands and arms. On August 14, 1951, he was discharged to a nursing home with the diagnosis of multiple neuropathy, cause unknown. Throughout his hospitalization he had required a great deal of analgesia. At the nursing home he was followed by a local physician who prescribed sedation for control of pain. After a period of time he became very erratic, manifested violent behavior, would scream and throw things. Thus, on November 11, 1951, he was again admitted to the hospital. Here he conversed with God, thrashed violently in bed, threw things at anyone who came by, was confused, unco-operative and continually screamed. After a period of a few days this behavior gave way to a more normal demeanor. Discharge was discussed with the patient, but he pleaded to be allowed to remain in the hospital. On November 15, 1951, he was discharged, only to be returned on November 24, 1951, talking to himself, his thoughts disorganized, incontinent and irrational.

He was committed to a mental hospital. On November 29, 1951, when examined at the mental hospital, he was found to be overactive, very talkative, excited, resistive, and having flights of ideas. However, he was not confused, and his memory was good. On March 20, 1952, the patient was very pleasant, co-operative, intelligent, lucid, prompt in response, but in pain. The examiner suggested drug toxicity as the cause of the patient's mental disability.

On examination at Fort Douglas he was not considered to be psychotic. His main concern was over the pain in his extremities. After the ward personnel became aware of the problem, the patient was easier to maintain. His psychosis resulted from oversedation in an attempt to control the discomfort secondary to his neuropathy. During each hospitalization this sedation wore off and the patient returned to normalcy. The diagnosis was acute brain syndrome associated with oversedation.

Sudden mental changes in the aged can be precipitated not only by organic disease but by sedation. Case 15 was very dramatic in this respect. The use of sedation in the aged should not be on the same basis as its use in the younger age group.

The acute brain syndrome represents a sudden change in mental behavior of an aged person due to an agent which throws the internal environment out of balance. Eradication of this factor permits the patient to return to normal.

Chronic Brain Syndrome Associated with Senile Brain Disease

This syndrome is designated as organic in origin and the term is commonly used to describe an elderly individual who manifests deviant behavior. Its general development and progress have been described under "Etiology of Senile Psychosis." In summary, these patients are confused, disoriented, and have loss of memory and the other features in the category labelled deterioration. Usually the patient is 65 or older.

This concept is the one most prevalent in medical circles. In contradistinction is the idea that the greater portion of the disability is functional. There is no doubt that there occur organic changes in the brain which are nonspecific in nature and which impair the efficiency of intracranial functions, but it should be recognized that functional changes are contributory and may even be the major contributing factor. The situation may be compared to that in which 2 patients have a moderate amount of atherosclerotic involvement of their coronary arteries, but are able to function. In one of them, emotional upset will reactivate an old peptic ulcer, but the heart will maintain its efficiency. In the other, emotional upset will cause paroxysmal auricular tachycardia, resulting in impaired cardiac status and decompensation. This same sequence of events may occur in the aged. A variety of agents may decrease the efficiency of their mental processes. An emotional episode finally comes along which further impairs the efficiency; decompensation occurs and the patient is then psychotic. In a case of paroxysmal tachycardia, reverse the tachycardia and the decompensation clears. In the aged psychotic patient, reverse the functional stress and the psychosis clears. Stress is a frequent cause of "senile psychosis." One should not always visualize senile brain disease as irreversible and organic.

Case 16. W.W.L., a 68-year-old white man was seen because of rapid development of senile psychosis.

Throughout his life, he had been an easy-going, sociable, friendly and happy person. At the age of 65 he was retired from his job. At the same time he was seen for a medical check-up and found to have an "aortic aneurysm." This disability was fully described to him, with its possible complications. The only advice given was to go to a lower altitude where the aneurysm could get better.

Following three months of vacationing in California, the patient returned to Salt Lake City, not feeling better. He was greatly concerned about the pulsation he felt below the left costal margin. During a period of three years his memory grew worse and he stated that his brain was "rotting." The only activity he was able to indulge in was driving his car, which he enjoyed and was able to accomplish quite easily.

Dealings with the patient revealed that the memory loss was an artefact. During all

social intercourse, he constantly kept his hands over the abdominal aortic pulsation, waiting for the rupture, never giving heed to the surrounding conversation. The "rotting of the brain" was manifested by memory loss and was claimed to be due to the arterial pathologic condition and some bizarre ideation concerning arterial networks. During treatment with sodium amytal, much hostility came to light relative to the doctor not being truthful about the low-altitude treatment; the boss' retiring him; the greater ability of his wife as a money-earner, child-raiser and significant person in their social community; his lack of education; and his being a great-grandfather. Under cover of the mental changes, he could do as he pleased. His wife, whom he always called his mother when under the influence of amytal, was now was forced to give him close care. These, and a number of other factors including results of psychologic testing, served to clarify the picture. The diagnosis was "senility" on an emotional basis.

SUMMARY

Too frequently the diagnoses of psychosis due to cerebral arteriosclerosis and psychosis due to senile brain disease are made without enough supporting evidence, using age as the only criterion. Rigidity of the environment sets up a tolerance factor which, when superseded by the patient, forces the diagnosis of psychosis in order to assure commitment to a mental hospital.

In the past, "senile psychosis" has been classified as an organic disease. Ideas are presented which may cause a modification of this classification. The disease may be a state of emotional senility, a true presbyphrenia, brought about by the stress of the accumulated emotional traumata of aging; the break in compensation produces the psychotic syndrome as the end-picture.

A diagnostic formulation has been presented for use in determining the dynamics of the psychosis, so that there may be an intelligent therapeutic approach.

The clinical syndromes of chronic brain syndrome associated with cerebral arteriosclerosis, chronic brain syndrome associated with senile brain disease and acute brain syndrome are described.

REFERENCES

1. Rothschild, D.: Pathologic changes in senile psychoses and their psychobiologic significance, *Am. J. Psychiat.* **93:** 757–784 (Jan.) 1937.
2. Alvarez, W. C.: Cerebral arteriosclerosis with small, commonly unrecognized apoplexies, *Geriatrics* **1:** 189–216 (May–June) 1946.
3. Fisher, M.: Concerning cerebral arteriosclerosis, *J. Am. Geriatrics Soc.* **2:** 1–18 (Jan.) 1954.

PROSTATIC CANCER. XIV. ITS INCIDENCE, EXTENT AND BEHAVIOR IN 686 MEN STUDIED BY PROSTATIC BIOPSY*

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With increasing longevity, there has been a significant alteration of the age groups within the population of the United States. In 1900 about 23 per cent of the population was over the age of 40. In 1940 the number of persons in this group had increased by half. By 1960 it is expected that over 36 per cent of the people of the United States will be over the age of 40, and that this population trend will continue for several decades (Fig. 1). With increased life span, there has been a parallel rise in the number of deaths which may be directly attributed to malignant neoplasms. Between the ages of 40 and 60, cancer causes 1 death in 6 among males. Of cancers which directly cause death in the aging male population, cancer of the prostate ranks third numerically (Fig. 2).

About 1 in 20 cases of cancer of the prostate in our clinics and hospitals is curable when the disease is first suspected (1). Although deaths from this malignant disease continue to rise each year, there has been little change in the numbers of cases detected before the development of metastases (2). Most of the localized cancers of the prostate do not cause physical changes of sufficient degree to arouse suspicion of cancer; in addition, symptoms which would bring the patient to a physician are generally absent (3, 4).

Carcinoma of the prostate is a frequent necropsy finding in apparently benign prostate glands (5–9). These incidental findings are considered representative of "latent" malignancy. Equivocal opinions concerning the tendency of latent prostatic cancer to metastasize and precipitate death have prompted an investigation of the biologic behavior of this form of the disease in a living population of apparently healthy men.

In April 1951, in collaboration with the Department of Welfare of the City of New York, the Urology Service of the Francis Delafield Hospital began a clinical study of prostatic cancer. An investigation of the frequency of unsuspected carcinoma of the prostate in a living population has been initiated (6, 9); the anatomic extent of these "latent" lesions has been determined; a comparison of the methods which may be employed in the early diagnosis of this disease has been made (10, 11); and a description of the biologic behavior of this neoplasm in a living population has been partially achieved. From previous communi-

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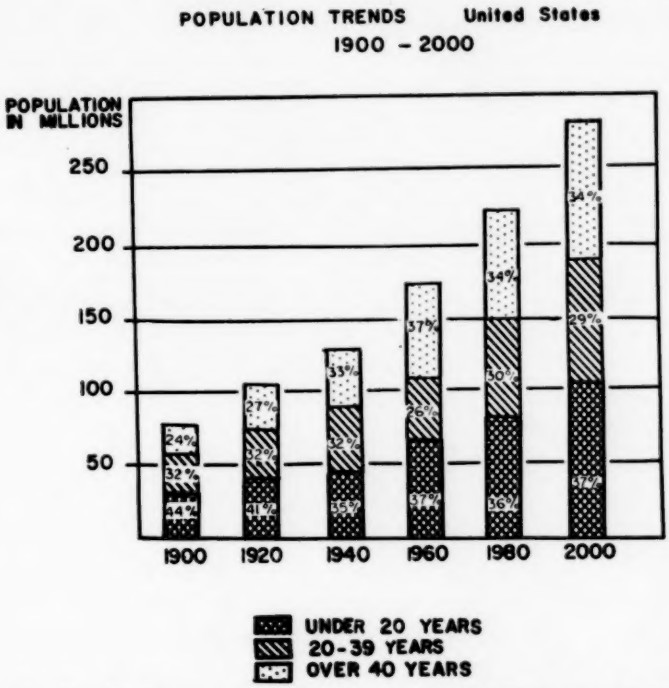

FIG. 1. The distribution of age groups within the United States population (years 1900–2000).

Source: Statistical Bulletin No. 6, 1956. The Statistical Research Section, American Cancer Society, New York, N. Y.

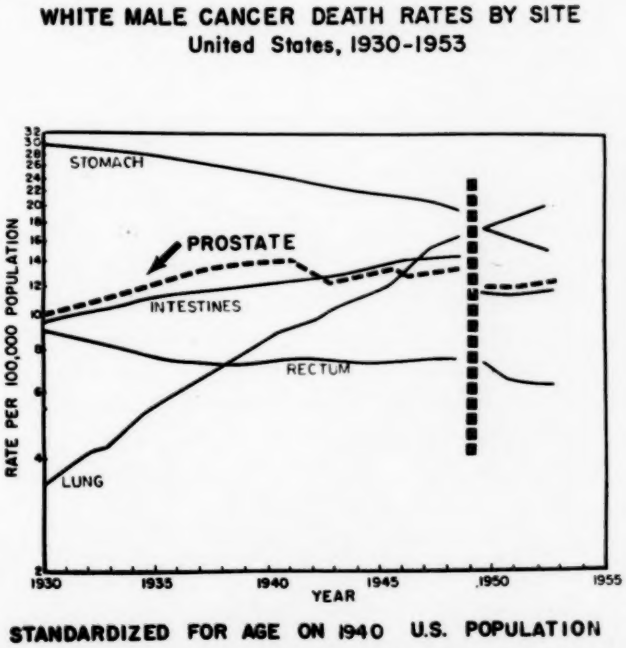

FIG. 2. White male cancer death rates (1930–1953). The apparent decrease in deaths since the year 1949 (vertical broken line) is a statistical artifact due to a change in the method of listing causes of death instituted by the U. S. Bureau of Vital Statistics at that time.

Source: Statistical Bulletin No. 6, 1956. Statistical Research Section, American Cancer Society, New York, N. Y.

cations (6 and 9–12), this study has become known as the Bowery Series. The current status of the investigation will be described here, and results of the follow-up of 340 patients for a period of over thirty months will be summarized.

CLINICAL METHODS

The men included in this clinical study were drawn from the residents of a locality known as the Bowery. The Bowery is an area, approximately one and one-quarter miles in length and one-tenth mile in width, extending north and south in the lower part of Manhattan from the Brooklyn Bridge to Cooper Square. In this section, from 10,000 to 16,000 transient casual laborers and pensioners reside in hotels, furnished rooms and lodging houses. The sociologic characteristics of this population, and of the patients included in these studies, will be discussed in a subsequent report.

The Department of Welfare of the City of New York operates a public, congregate shelter within this community, where impoverished men may receive short-term food and lodging. The rapid turnover in the institution permits the appraisal of large numbers of persons in an older age group, and allows the selection of men who are apparently free of chronic disease. With the cooperation of public welfare authorities, screening interviews are conducted at the shelter. The men are subsequently hospitalized for detailed medical evaluation.

Since April 1951, over 955 men have been admitted to the Francis Delafield Hospital. The first 141 patients gave histories of minimal symptoms suggestive of prostatic obstruction. In the remaining 814 cases, the patients presented no complaints of "prostatism."

Subsequent to hospital admission, a detailed social and medical history is obtained. Each patient is given an exhaustive, standardized physical examination, including rectal palpation of the prostate. The clinical impression of the prostatic findings is noted in the medical record. Clinical laboratory procedures include urinalysis, a serologic test for syphilis, bacteriologic culture of voided and of catheterized residual urine, two-hour phenolsulfonphthalein renal function test, complete blood cell counts, and determination of blood levels of nonprotein nitrogen, chlorides, carbon dioxide combining power, total protein, sugar, and acid and alkaline phosphatases. X-ray examination includes a roentgenogram of the chest and a complete skeletal survey to detect osseous metastasis. An excretory urogram is obtained for each patient and if the results require elucidation, retrograde pyelographic studies are made. Subsequently, cystoscopic examination of the patient is performed. During cystoscopy, the prostate is palpated rectally by several members of the staff, and the final clinical diagnosis is noted in the medical record.

After the completion of the clinical evaluation, permission is solicited to perform a perineal biopsy of the prostate, and other procedures when necessary. In 686 of 824 requests, such consent has been obtained.

The technique of perineal biopsy employed is essentially that described by Young (13), as modified by Belt (14). Immediately after removal of the specimen, the surgical wound is packed with saline-moistened gauze. The biopsy

specimen is split longitudinally, and half of it is fixed in hot Bouin's solution for one minute, frozen, and cut at 5 to 7 micra. Sections taken from different levels of this half-specimen are stained with metachrome B and floated onto slides. The other half of the specimen is preserved for permanent paraffin sections.

The microscopic differential diagnosis of infiltrating and anaplastic carcinomas, and also "small gland" carcinoma, is such that the cellular characteristics of prostatic malignancy are sufficiently definite to be evident from frozen-section specimens (6).

If no cancer is found, the wound is closed, unless there is clinical indication for surgery to relieve obstruction from prostatic enlargement. Upon finding a curable adenocarcinoma, an immediate radical perineal prostatectomy and bilateral orchiectomy are performed. The oral administration of diethylstilbestrol in a dosage of 500 milligrams daily is initiated (15).

Regardless of diagnosis, all patients are followed in the out-patient department at regular intervals. At each out-patient visit, a brief physical examination, including rectal palpation of the prostate, is performed. Radiographic studies of the chest, kidneys, ureters and bladder are made, as well as clinical laboratory tests which include urinalysis and serum acid-phosphatase determinations. These studies are repeated at intervals of three months in cases with a definite diagnosis of prostatic malignancy, at intervals of six months in cases with a diagnosis of normal tissue, and at intervals of twelve months in cases in which the clinical impression indicates normal tissue. Since it is recognized that a five-year period is insufficient for the establishment of cure of prostatic cancer on the basis of cancer-free survival, and for the study of the biologic behavior of

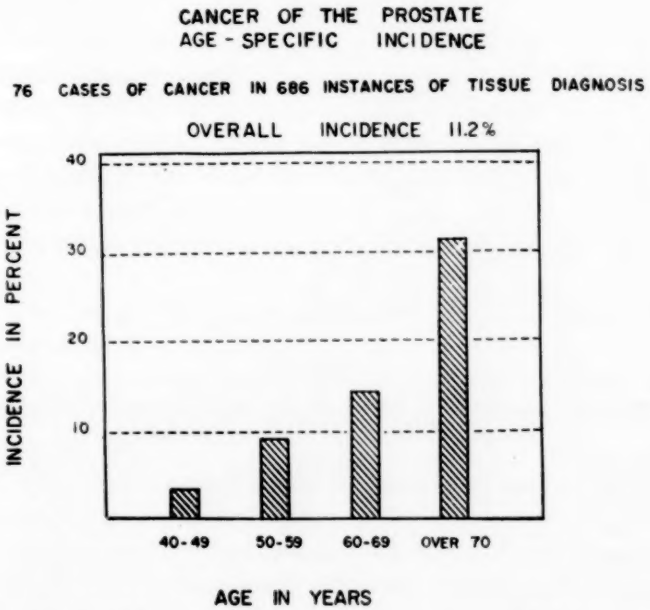

FIG. 3. Age-specific incidence of prostatic cancer diagnosed by open perineal biopsy among 686 patients in the Bowery Series.

this malignant lesion in the living population, it is necessary to follow patients for ten years. The follow-up of patients is the responsibility of a special unit, which functions through a coordination of its activities with the activities of physicians, municipal, state and federal governmental agencies, and medical and social agencies within the city and throughout the metropolitan area. The basic clinical and social data for each patient obtained during the course of the study are noted upon marginally punched tabulation cards which serve as a master index, and also provide data for research and the periodic review of after-care status in each case. Conventional methods of follow-up have been used in a formalized situation in which, by controlled clerical processes, extensive knowledge of the social background in each case permits almost continuous follow-up of the patient through direct contact with him (or his relatives) or through liaison with interested professional agencies.

CLINICAL FINDINGS

Based upon tissue diagnosis, unsuspected adenocarcinoma of the prostate was detected in 76 of the 686 men in whom biopsy was performed—an overall frequency of 11.1 per cent (Fig. 3). When these overall findings were adjusted for age, the age-specific incidence of this lesion ranged from over 3 per cent in the fourth decade to over 31 per cent in the seventh and eighth decades (Table 1).

The anatomic extent of the prostatic cancers established by tissue diagnosis in these 76 cases is shown in Table 2.

We de-emphasized the classification of malignant tumors dependent upon the findings of physical examination, upon the morphologic configuration of the

TABLE 1

Age-Specific Incidence of Histopathologically Demonstrated Malignancy in 686 Living Men

	Number of Subjects	Number of Cases of Malignancy	Incidence of Malignancy %
Under age 40	4	—	—
Ages 40–49	94	3	3.2
Ages 50–59	336	32	9.5
Ages 60–69	206	29	14.0
Over age 70	46	12	31.3
	686	76	11.1

TABLE 2

Classification of 76 Cases of Prostatic Malignancy detected in 686 living men. Diagnosis based upon biopsy findings.

Prostatic Cancer	Number of Cases	Per Cent
Group I	41	54
II	23	30
III	3	4
IV	7	9
V	2	3
	76	

FIG. 4. Cancer of the prostate—Group I. Tumors confined to the prostate gland without direct invasion of the anatomic capsule and without perineural invasion.

tumor, or upon quantitative estimation of anaplastic cells. Our classification was based upon the microscopically ascertained extent of the disease and evidence of metastatic spread (Figs. 4–8). This led to the establishment of the following categories for the 76 cases of prostatic malignancy detected during the course of this investigation:

Group I. The lesion was confined within anatomic capsule, without perineural invasion.

Group II. The tumor was found in the perineural lymphatic channels, without periprostatic extension.

Group III. The growth had extended from the prostate gland and its capsule as far as the fascial coverings of the seminal vesicles, but there was no demonstrable periprostatic extension.

Group IV. The tumor had penetrated the anatomic capsule and invaded the fascial covering of the seminal vesicle.

Group V. There was evidence of spread beyond the prostate and seminal vesicles, on the basis of biopsy findings, x-ray studies, or increase in serum acid-phosphatase activity.

As shown in Figure 9, half of the 76 cases were in Group I. An additional

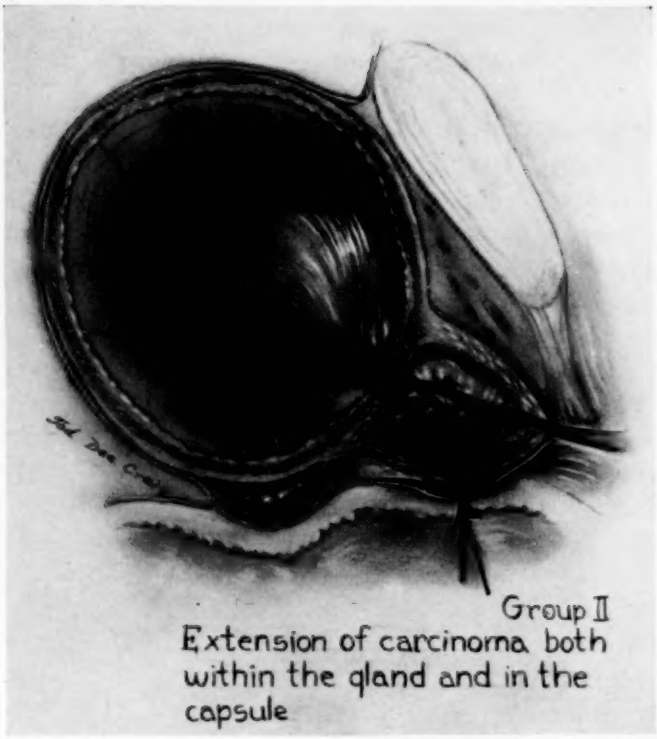

FIG. 5. Cancer of the prostate—Group II. Tumors confined to the substance of the prostate gland, with the single exception of tumor cells within the anatomic capsule but not beyond that point.

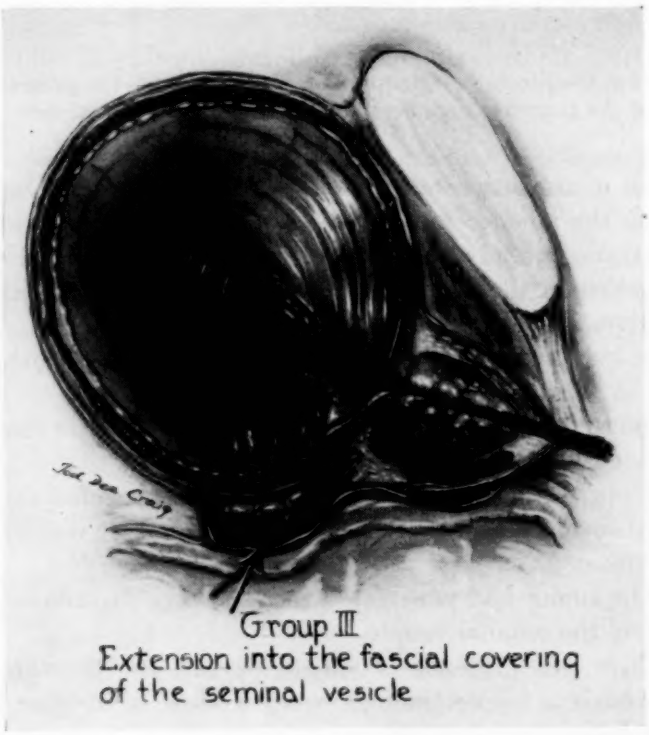

FIG. 6. Cancer of the prostate—Group III. Tumors that have extended from the prostate gland and its capsule as far as the fascial covering of the seminal vesicles, without demonstrable extension into the periprostatic tissues.

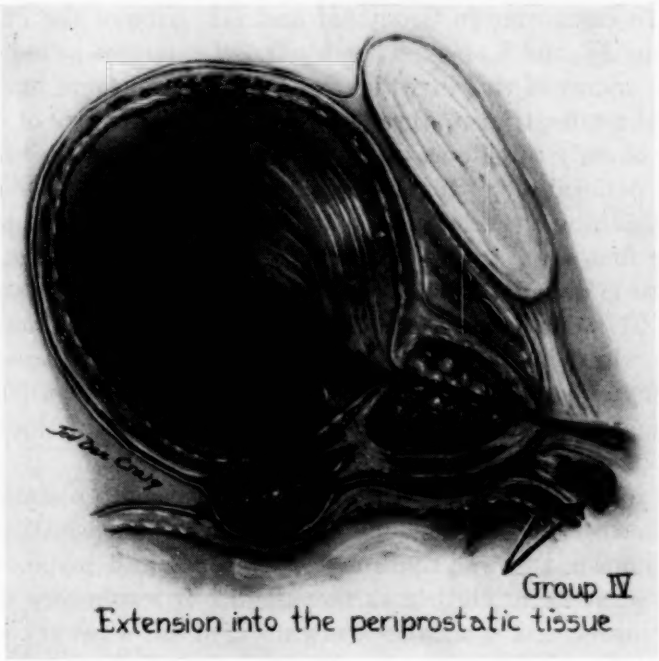

FIG. 7. Cancer of the prostate—Group IV. Tumors that have invaded periprostatic structures, but without demonstrable evidence of distant metastasis by radiographic, biochemical or other means.

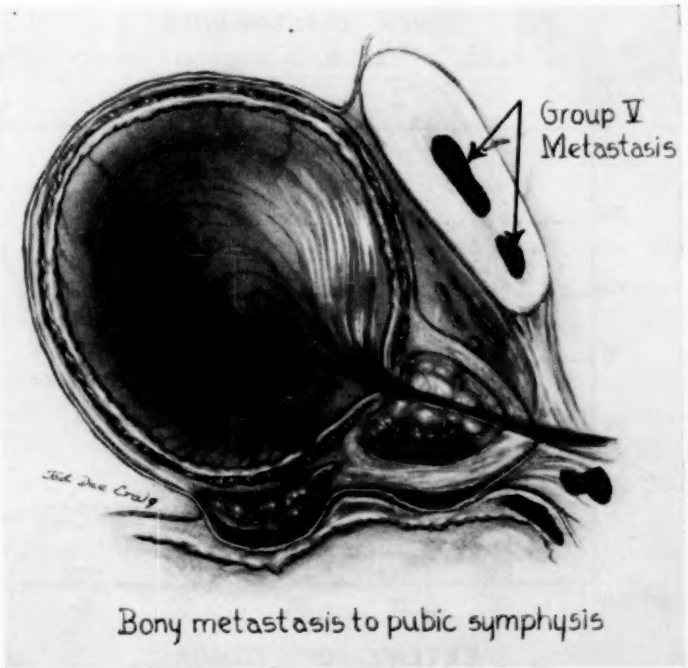

FIG. 8. Cancer of the prostate—Group V. Tumors with evidence of spread beyond the prostate and seminal vesicles, as determined by biopsy, roentgenogram, or an increase in serum acid-phosphatase activity. (Cases of soft-tissue metastasis are included.)

third of the 76 cases were in Groups II and III. Nine of the 76 (12 per cent) were in Groups IV and V.

During the course of this investigation, comparisons were made of the relative efficacy of needle, transurethral and open perineal biopsy of the prostate in the detection of early carcinoma of the prostate. This experience has shown that open surgical perineal biopsy of the prostate has provided the most dependable means of establishing or excluding a diagnosis of early prostatic cancer (10, 11).

During the first thirty months, prostatic biopsy was performed in 340 patients. The tissue diagnoses in this group are summarized in Table 3. Of these 340 patients, 277 were followed for from thirty to fifty-four months or longer. Of the group which has been followed, 238 patients with diagnoses of normal prostatic tissue were seen at intervals of six months, and 39 patients with tissue diagnoses of malignant lesions were examined at intervals of three months. The survival periods for both groups are summarized in Table 4.

Of the 238 followed patients with diagnoses of normal prostatic tissue, 58 or 20 per cent died within fifty-four months. In 55 of the 58 instances, the cause of death was known, and was confirmed by autopsy in 4 instances. Thirty-five patients died of acute or chronic cardiovascular or respiratory disease; 9 died of accidental injury and 4 of other causes; 1 died (after twenty-nine months of follow-up) from uremia secondary to obstruction of the bladder neck; 5 died of malignant disease; and 1 died of a neoplasm which was questionably malignant. None of the latter 6 neoplasms was of prostatic origin.

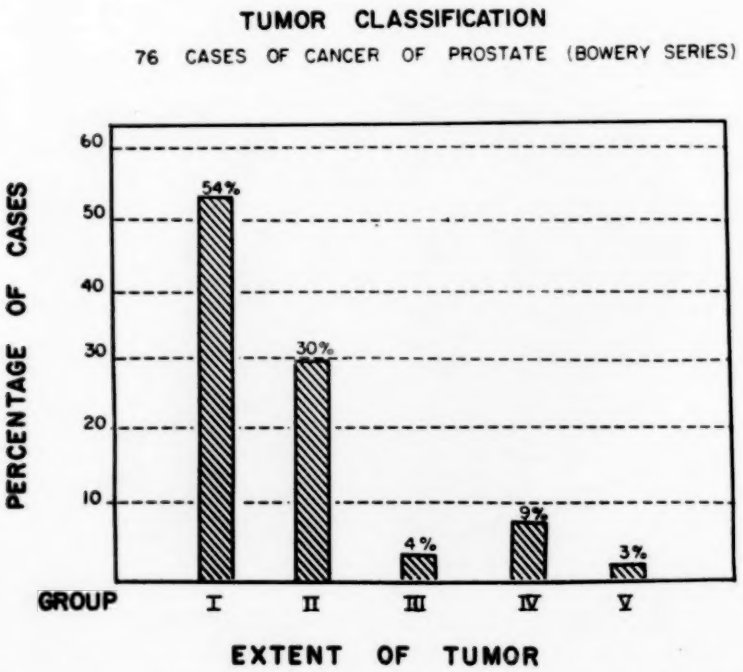

FIG. 9. Anatomic extent of 76 cancers of the prostate diagnosed by arbitrary open perineal biopsy of the prostate among 686 unselected cases.

TABLE 3

Follow-up data over a period of 2.5 to 5.5 years in 340 patients on whom prostatic biopsy was performed

Duration of Follow-Up	Number of Cases	Prostatic tissue (biopsy)	
		Benign	Malignant
54–66 months	64	50	14
42–53 months	135	114	21
30–41 months	141	131	10
	340	295	45

TABLE 4

Survival data in 340 patients on whom prostatic biopsy was performed

	Biopsy diagnosis	
	Benign	Malignant
Per cent followed	81	87
Per cent surviving	61	57
Per cent deceased	20	30

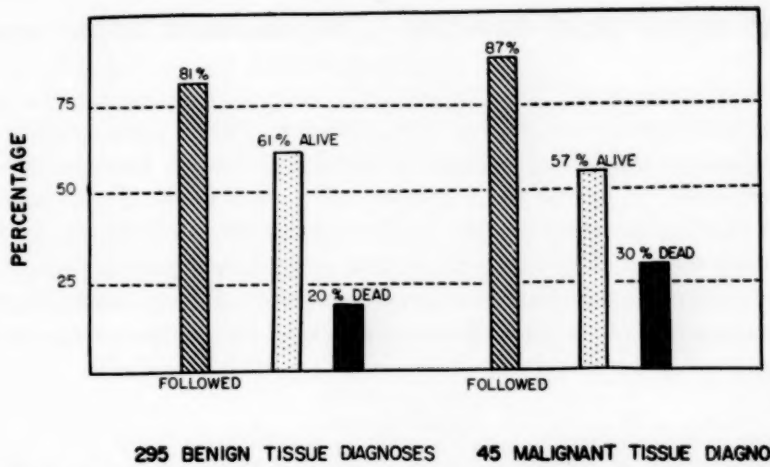

FIG. 10. Follow-up for 30 to 54 months of 340 patients of the Bowery series in whom prostatic biopsy was performed.

In 22 instances, patients with a diagnosis of benign tissue were completely re-evaluated after thirty-one months or more. In 1 additional instance, the patient was hospitalized because of prostatic obstruction. In these 23 instances, an arbitrary re-biopsy of the prostate was performed. In 3 of the 23 cases (13 per cent), a tissue diagnosis of malignancy was made.

Except for these 3 instances, there was no clinical, laboratory or radiographic evidence of the occurrence of malignant disease in the 180 living patients with a diagnosis of benign tissue. The follow-up of these patients is shown in Figures 10 and 11.

Thirty-nine patients with tissue diagnoses of prostatic malignancy were followed; 14 (30 per cent) died. Except in 1 instance the cause of death was known,

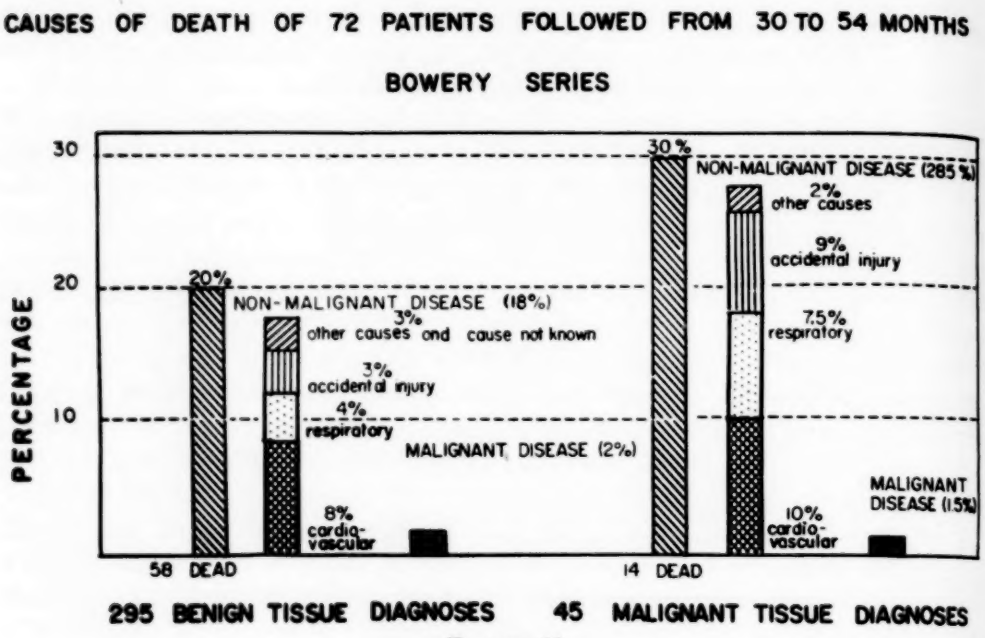

FIGURE 11

and necropsy was performed in 5 of these 13 cases. Seven patients died of acute or chronic disease, and 4 died because of accidental injury. Two patients died of malignant disease. In one of these 2 cases, the primary site of the lethal malignancy was not the prostate gland. In the other case, *prostatic cancer had been detected during the course of the study, but the patient subsequently refused surgical and endocrine therapy and death was ascribed to cancer of the prostate.* Twenty-five patients with cancer of the prostate have survived for thirty months to five and a half years.

DISCUSSION

This communication contains the first detailed reference to the follow-up of patients in the Bowery Series. It must be emphasized that the study has not been completed. However, it has become increasingly evident that latent prostatic cancer in a form detectable by biopsy is often present in men of the age groups in which "benign" prostatic enlargement is found. Benign enlargement frequently coexists with curable cancer.

The finding of a significant percentage of prostatic cancers of Groups II, III, IV and V should give pause to physicians who would treat "latent" prostatic cancer as a harmless disease.

The patient cited here, whose latent malignant lesion was not treated and whose death was attributed to prostatic cancer, is another example of the lethal potentiality which is a biologic characteristic of at least some "latent" cancers.

In previous reports based upon perusal of data from the Bowery Series, a plea was made for more frequent use of tissue diagnosis in all forms of prostatic enlargement which require surgery. The conclusion was drawn that soft (*i.e.*, soft

to palpation) adenocarcinoma of the prostate is a more common finding than indurated cancer during the period of time before metastasis occurs.

Since the 10-year cancer-free survival rate among men with early prostatic cancer treated by total prostatectomy is approximately twice that among men treated by palliative measures alone, it seems logical to conclude that patients with localized lesions should be treated by total prostatectomy. In order to implement this thought, it has been suggested that patients whose prostatic obstruction requires surgical relief be given the benefit of a posterior prostatic biopsy before the prostatic enlargement is considered benign. This course of action is one which the author believes to be conservative, because surgical treatment without a tissue diagnosis—conservative "prostatectomies" do not include sampling of the main (posterior) cancer-forming part of the prostate—seems a radical departure from logical thought.

SUMMARY

A clinical study is presented of the incidence of unsuspected prostatic cancer in the aging male population in New York City.

The method of selection of patients, details of examination and treatment, and routine of follow-up are described.

Among 686 subjects, a diagnosis of prostatic cancer was made in 76 (11.1 per cent) on the basis of biopsy findings.

In the 76 cases of prostatic cancer, the tumor proved to be inoperable in 9 (12 per cent).

In 23 cases in which the first biopsy diagnosis had been benign tissue, a second biopsy showed malignant disease in 3 (13 per cent).

The significance of data accumulated to date in this study and plausible applications in the clinical management of prostatic disease are discussed.

REFERENCES

1. Mayer, E., and Roswit B.: Palliative treatment of nonresectable pulmonary neoplasms —primary and metastatic, *New York J. Med.* **53:** 1647–1653, 1953.
2. United States Bureau of the Census: Vital Statistics of the United States, 1953.
3. Edwards, C. N.; Steinthorsson, E., and Nicholson, D.: An autopsy study of latent prostatic cancer, *Cancer* **6:** 531–554, 1953.
4. Rich, A. R.: On the frequency of the occurrence of occult carcinoma of the prostate, *J. Urol.* **33:** 215–223, 1935.
5. Hinman, F., Jr., and Hinman, F.: Occult prostatic carcinoma diagnosed upon transurethral resection, *J. Urol.* **62:** 723–729, 1949.
6. Hudson, P. B.; Finkle, A. L.; Trifilio, A.; Jost, H. M.; Sproul, E. E., and Stout, A. P.: Prostatic cancer. VIII. Detection of unsuspected adenocarcinoma in the aging male population, *J. A. M. A.* **155:** 426–429, 1954.
7. Smith, G. G., and Woodruff, L. M.: The development of cancer of the prostate after subtotal prostatectomy, *J. Urol.* **63:** 1077–1080, 1950.
8. Totten, R. S.; Heinemann, M. W.; Hudson, P. B.; Sproul, E. E., and Stout, A. P.: Microscopic differential diagnosis of latent carcinoma of the prostate, *A. M. A. Arch. Path.* **55:** 131–141, 1953.
9. Hudson, P. B.; Finkle, A. L.; Hopkins, J. A.; Sproul, E. E., and Stout, A. P.: Pros-

tatic cancer. XI. Early prostatic cancer diagnosed by arbitrary open perineal biopsy among 300 unselected patients, *Cancer* **7:** 690–703, 1954.

10. Hudson, P. B.; Finkle, A. L.; Trilfilio, A., and Wolan, C. T.: Prostatic cancer. IX. Value of transurethral biopsy in search of early prostatic carcinoma, *Surgery* **35:** 891–900, 1954.
11. Hudson, P. B.; Finkle, A. L.; Jost, H. M.; Trifilio, A., and Stout, A. P.: Prostatic cancer. X. Comparison of open and 'punch' biopsy techniques, *A. M. A. Arch. Surg.* **70:** 508–512, 1955.
12. Hudson, P. B.; Finkle, A. L., and Totten, R. S.: Prostatic cancer. I. A classification of adenocarcinoma of the prostate gland, *Cancer* **5:** 1225–1228, 1952.
13. Young, H. H., and Davis, D. M.: *in* Young's "Practice of Urology." Philadelphia, W. B. Saunders Company, 1926. Vol. 2, pp. 414–512.
14. a) Belt, E.; Ebert, C. E., and Surber, A. C., Jr.: A new anatomic approach in perineal prostatectomy, *J. Urol.* **41:** 482–497, 1939. b) Belt E.: Radical perineal prostatectomy in early carcinoma of the prostate, *Ibid.* **48:** 287–297, 1942.
15. Hudson, P. B.: Prostatic cancer. IV. Combined surgical and endocrine management of curable lesions, *Surg., Gynec. & Obst.* **96:** 233–234, 1954.

Abstracts of Current Literature

GASTROINTESTINAL HEMORRHAGE IN ELDERLY PATIENTS

Almy, T. P.; Roseman, D. M., and Braveman, W. S. *Bull. New York Acad. Med.* **32:** 337 (May) 1956.

Attention is called to a variety of clinical consequences of gastrointestinal hemorrhage in the elderly which are related to the circulatory readjustments to a diminished blood volume. Compensatory reduction in renal or hepatic blood flow, if prolonged, may lead to acute renal or hepatic failure. Diminished blood flow in the extremities may result in arterial thrombosis and subsequent gangrene. With inadequacy of these compensatory mechanisms, the coronary or cerebral blood flow is reduced and, particularly in the presence of localized arteriosclerotic narrowing, myocardial infarction or a cerebrovascular accident may occur. Case reports illustrate each of these possibilities. In the management of gastrointestinal hemorrhage in elderly patients, the pulse and blood pressure are not adequate guides to necessary treatment, inasmuch as the internal readjustments of the circulation tend to maintain normal vital signs even at the expense of renal and hepatic blood flow. As crude reflections of the renal blood flow, daily measurements of urinary output and serial determinations of blood urea nitrogen concentration are made. The status of the hepatic circulation is judged by serial estimations of serum bilirubin and of bromsulfalein retention. In some instances blood volume provides vital information about the adequacy of blood replacement. A routine electrocardiogram is recommended for every elderly person with severe hemorrhage, inasmuch as some of the myocardial infarctions seen have been painless. The most important consideration in treatment is the full and prompt replacement of the blood loss. The replacement must be adequate to relieve not only hypotension but also the indications of renal, hepatic and cerebral vasoconstriction. In some cases, emergency operation may incur less danger for the patient than would continued, inadequately compensated bleeding. The patient with functional disturbances of a vital organ who is not responding promptly to conservative measures deserves consideration for surgery before irreversible damage is caused. Gastrointestinal hemorrhage in the elderly is largely a preventable catastrophy. The major opportunities for prophylaxis lie in better treatment of peptic ulcer, hiatus hernia and diverticulitis, which can be safely and effectively treated in early or middle life.

PLACENTAL POLYPS—AN UNUSUAL CAUSE OF POSTMENOPAUSAL BLEEDING

Baldwin, W. C. *Am. J. Obst. & Gynec.* **71:** 1126 (May) 1956.

Placental polyps occurring one or more years after the last pregnancy or abortion constitute a rare clinical entity. A case is presented of placental polyps with vaginal bleeding occurring in a 57-year-old woman five years after the menopause. A polyp protruding through the external os of the cervix preoperatively was not present when dilatation and curettage were performed. It was thought to have been expelled without an increase in vaginal bleeding. The endometrial tissue of this patient in some areas showed a decidual reaction of pregnancy. No evidence of malignancy was noted.

PREOPERATIVE PREPARATION OF THE PATIENT WITH CORONARY ARTERY DISEASE.

Bellet, S. *Anesthesiology* **17:** 391 (May) 1956.

For purposes of preoperative management, persons with coronary artery disease fall into groups: older people who are relatively symptom-free, patients with anginal syndrome (coronary insufficiency), patients with previously healed infarction, patients with an infarction in the previous two weeks or few months, patients with arrhythmias, and persons with congestive heart failure. Preoperatively, the internist is confronted first

with the problem of establishing the presence, type and severity of coronary artery disease and determining what complications exist. The diagnostic features of coronary artery disease are enumerated. In the case of an acute surgical emergency, a distinction frequently must be made between various acute abdominal conditions that may simulate acute myocardial infarction and vice versa. The use of the electrocardiogram under these circumstances may be attended by difficulties such as the delay of the development of a characteristic pattern for twenty-four to thirty-six hours in a patient with coronary occlusion with shock, inability to diagnose acute infarction in patients with previous electrocardiographic abnormalities particularly in the presence of bundle-branch-block digitalis effects and auricular fibrillation, and the fact that abdominal conditions such as those associated with vomiting and diarrhea and shock-like situations may cause electrocardiographic changes. A rise in the level of serum glutamic oxalacetic transaminase is confirmatory of acute infarction in the presence of a suggestive clinical picture and equivocal electrocardiographic signs. Operation should rarely be performed in the presence of acute infarction, and only when there is an acute emergency. The added risk is warranted in the case of perforated ulcer, ruptured gallbladder, or acute intestinal obstruction. A reason not to withhold operation in some cases is the relatively long survival periods observed following coronary occlusion. Operation should be postponed for at least six to eight weeks and preferably for three to six months following an infarction. Statistics are cited to show that the operative mortality in patients with coronary artery disease has decreased in recent years. When a decision has been made to operate, attention should be paid to the correction of anemia, sedation, digitalization, and the use of anti-arrhythmic drugs. Reassurance and the use of sedatives and tranquilizing drugs are helpful in nervous, apprehensive patients. The surgical risk is difficult to calculate. An important factor is the ability of the heart to respond to effort, but intangible factors such as the length of the operation, development of arrhythmia, hypertension, occurrence of shock, hemorrhage, and the patient's response to these complications are difficult to determine.

ENVIRONMENTAL CHANGE AND AGE OF ONSET OF PSYCHOSIS IN ELDERLY PATIENTS.

Buck, C.; Wanklin, J. M., and Hobbs, G. E. *A. M. A. Arch. Neurol. & Psychiat.* **75:** 619 (June) 1956.

To explore the possibility that environmental change can accelerate the onset of the psychoses of old age, an examination has been made of the degree of statistical association existing between the age of the patient at the onset of these psychoses and the age at the time of occurrence of three kinds of environmental change. The analysis was based upon 516 mental hospital patients aged 65 years and over. Compared with the average age at onset for the group as a whole, was that for 245 patients among whom retirement, a move to an area of a different population size, or a change in living arrangement had occurred (alone or in combination) after age 40 but before onset of psychoses. In patients with certain combinations of these three changes, the average age at onset was earlier than expected. This was particularly true of men who had experienced a change in area of residence and of women who had a history of change both in area of residence and in living arrangement. In general, degrees of association were consistent among the three diagnostic groups considered—senile psychosis, cerebral arteriosclerosis, and a mixed group of affective, schizophrenic and other disorders. Although far from conclusive, it is suggested that these observations are at least compatible with the initiating hypothesis of the study. (From authors' summary)

THE DETERMINATION OF INDIVIDUAL ENLARGEMENT OF THE VENTRICLES BY RADIOLOGIC METHODS.

Ceballos, J.; Calderon, R., and Kargl, O. *Am. Heart J.* **49:** 606 (Apr.) 1956.

A method for measurement of the ventricles of the heart is re-evaluated. It is based upon the localization of the interventricular septum fluoroscopically or radiographically

in the left anterior oblique position. When the septum is localized, two perpendicular lines are drawn to extend to the cardiac shadow at its most convex part. The anterior line represents the width of the right ventricle, and the posterior line that of the left ventricle. One hundred fifteen patients were examined. Most of them were more than 30 years of age. The conditions present were as follows: hypertensive heart disease, 55; syphilitic aortic regurgitation, 15; arteriosclerosis, 5; mitral valve disease, 5; anemia, 2; and pregnancy, 3. The left ventricle was enlarged in hypertensive heart disease and in syphilitic aortic regurgitation. This ventricle was only slightly enlarged or not at all in arteriosclerosis. No enlargement, or enlargement of the right ventricle, was present in mitral valve disease. This is the case if stenosis is predominant over the insufficiency. If the lesion is "double mitral," both ventricles will be enlarged. Anemic patients showed moderate, and pregnant women slight, globular enlargement of the heart.

DIABETIC PNEUMATURIA.

Foord, R. D.; Nabarro, J. D. N., and Riches, E. W. *Brit. M. J.* **1:** 433 (Feb. 25) 1956.

Primary pneumaturia—pneumaturia in the absence of instrumentation or a bladder fistula—is more common in persons with diabetes than in those without. It probably occurs more frequently than published reports indicate. It is associated with infection of the urinary tract, usually with *E. coli*. The gas is formed by the action of this organism on the glucose in the urine. In many cases it is associated with obstruction of the lower urinary tract, or residual urine due to a diabetic neuropathy or vesical diverticulum. Pneumaturia in a patient with diabetes will disappear if glycosuria is controlled by suitable diabetic management and infection is eliminated by the use of antibiotics or chemotherapy in combination, when necessary, with relief of obstruction of the urinary tract.

CEREBRAL VASCULAR INSUFFICIENCY FOLLOWING MINOR SURGERY IN THE AGED.

Hammes, E. M., Jr. *Am. J. Surg.* **91:** 924 (June) 1956.

The frequency of occurrence of the syndrome of acute cerebral vascular insufficiency following minor surgery during the latter decades of life is emphasized. In these years, decreased adaptability and the presence of arteriosclerosis may be well tolerated until the patient is faced with the need to adjust to a group of factors, each of which tends to contribute some degree of transient cerebral anoxia. The capability of the brain to resist anoxia and to recover from its effects seems to vary inversely with age. It has been shown by various investigators that a marked decrease in cerebral blood flow and increase in cerebral vascular resistance occurs in persons over the age of 50 years. These changes are more pronounced in patients with cerebral vascular disease. Among the many factors that contribute to acute cerebral vascular insufficiency, most can be determined preoperatively. They apparently act by producing anoxia of the stagnant anemic or anoxic types. The risk of anoxia of the stagnant variety can be estimated by evaluating the age of the patient, the degree of arterial hypertension as a measure of peripheral vascular resistance, the duration and depth of anesthesia, immobilization of the patient, the amount of analgesics and sedatives (analgesics tend to create an anoxic type of anoxia), anything that decreases respiratory excursion, and the amount of blood loss in cases of trauma. The two categories of minor surgery in which cerebral vascular insufficiency is most likely are cataract surgery (because of the usually advanced age of the patient and the need for immobilization) and traumatic surgery with the added factor of blood loss. Inasmuch as the two principal factors—arteriosclerosis and decreased adaptability of older persons to physiologic stress—cannot be attacked clinically, treatment should consist of an attempt to minimize the degree and duration of anoxia of all types. It should include: 1) careful weighing of the need for surgery against conditions that may contribute to anoxia, 2) the institution of prompt treatment at the first sign of cerebral vascular insufficiency, and 3) the use of measures to prevent cerebral anoxia or correct it, once established. Such meas-

ures include the use of local or spinal anesthesia, if possible and safe; if not, the least amount of general anesthesia for the shortest possible period of time, the correction of blood loss and decreased circulating volume, early ambulation of the patient, the use of 5 to 10 per cent carbon dioxide in oxygen intermittently during the first postoperative days, and the use of a minimum amount of analgesics and sedatives. Two illustrative case reports are included.

CAUTION AGAINST THE USE OF MEPERIDINE HYDROCHLORIDE (ISONIPECAINE, DEMEROL) IN PATIENTS WITH HEART DISEASE, PARTICULARLY AURICULAR FLUTTER.

Harvey, W. P.; Berkman, F., and Leonard, J. *Am. Heart. J.* **49:** 758 (May) 1956.

Harmful effects of meperidine hydrochloride in a patient with auricular flutter prompted a re-evaluation of the effects of this drug in persons with heart disease. Pharmacologically, meperidine resembles atropine and quinidine, so that similar effects upon the heart may perhaps be anticipated. The deleterious effects of rapid heart action in patients with heart disease are reviewed. Theoretically, meperidine by means of its anticholinergic action appears capable of producing tachycardia, particularly in persons with auricular flutter. In 3 cases reported, meperidine caused acceleration in heart rate in patients with auricular flutter. In a fourth patient with auricular flutter following mitral commisurotomy, injections of meperidine were followed by increases in heart rate of 60 and 44 beats per minute. Tachycardia was produced in a patient with moderate congestive heart failure by the injection of 100 mg. intramuscularly. No change occurred in heart rate in 2 patients with auricular flutter given meperidine, so that this effect apparently will not occur in an unknown proportion of patients with this condition. It is recommended that meperidine be used with caution in selected cases of heart disease, particularly those with auricular flutter.

THE HEALTH OF THE ELDERLY AT HOME.

Hobson, W., and Pemberton, J. *Brit. M. J.* **1:** 587 (March 17) 1956.

Results are presented of a survey to investigate the state of health and the diets of elderly people living at home in Sheffield; to examine the relation between health and such factors as age, sex, marital state, social class and diet; and to collect information on normal physiologic standards in the elderly. The sample examined contained 192 men aged 66 years or over and 284 women aged 61 years or over. The incidence of various diseases is given. Among cardiovascular diseases, the most common conditions were angina of effort, pulmonary heart failure, "hypertensive heart failure," and cardiovascular accidents, in equal numbers. Next in frequency were rheumatic heart disease, degenerative aortic disease, peripheral vascular disease, and syphilitic aortic disease. Much undiagnosed illness and disability was discovered, including a few serious conditions for which treatment was required. It became obvious that advancing age increases the risk of ill health and disability. Conditions found frequently in older age groups include cardiovascular disease, rheumatoid arthritis, deafness, vertigo, loss of vibration sense, senile dementia, radiologic enlargement of the heart, unfolding and calcification of the aorta, radiologic "lipping" in the thoracic spine, and thoracic kyphosis. Sex differences in the incidence of several conditions suggested that endocrine or occupational factors might be of etiologic importance. The social class complex of conditions, which include previous occupation, present income, and place of residence appeared to be of some importance in determining health in the elderly. The evidence for an influence of marital state and obesity upon health, although inconclusive, suggested that persons living alone were perhaps less fit than married persons and that in the case of women, obesity bore some relation to ill health. An adequate well-balanced diet was clearly an important factor in

preserving the health of the elderly. Mental factors characteristic of older persons, such as apathy and forgetfulness, were found to affect health adversely by leading to neglect of cleanliness and care of the feet, and to an inadequate diet. Working after the usual age of retirement apparently had no effect on physical health and many of those still working seemed particularly cheerful and alert. The prevention of disease and disability in the elderly is discussed and suggestions offered. Certain specific routine examinations aimed at early diagnosis are suggested as worthy of consideration. In order to determine standards for normal biochemical values in older persons, the following measurements were made: hemoglobin, serum calcium, serum cholesterol, serum alkaline phosphatase, and blood urea. The values were plotted as a frequency distribution for each sex. Those for hemoglobin and serum calcium concentration fitted a "normal" curve. Those for serum cholesterol, serum alkaline phosphatase, and blood urea concentration were of the log-normal type of distribution. The levels of the latter are higher than in younger age groups.

ACUTE EMPHYSEMATOUS CHOLECYSTITIS.

Jacobs, J. K. *Am. J. Surg.* **91:** 799 (May) 1956.

Acute emphysematous cholecystitis is a relatively uncommon disease characterized by acute inflammation of the gallbladder with gas accumulation within its lumen. First described in 1901, it was diagnosed prior to surgery for the first time in 1931. The 34 cases appearing heretofore in the world literature are summarized and 2 new cases described. Roentgenographic examination remains the only method for making a preoperative diagnosis. The diagnosis is dependent upon the plain film of the abdomen showing gas in the gallbladder lumen. A gas-fluid level is frequently demonstrated. The most common age group affected is that of the fifth and sixth decades. The incidence in men as compared with women is 2 to 1. Two of the 36 reported patients had diabetes, but not all required insulin management. Jaundice was a clinical sign in approximately 40 per cent of the cases. A slight elevation in temperature is characteristic of the disease. A mixture of bacteria may be cultured from the gallbladder but the clostridia group is the most frequent (45 per cent of reported cases). *B. coli* has been isolated in 30 per cent of the cases reported; other bacteria have included aerobic and anaerobic streptococci, *Streptococcus fecalis*, and staphylococcus. Eighty-six per cent recovery has taken place among the 33 patients in whom acute emphysematous cholecystitis was diagnosed during life. Among the 5 fatal cases, 3 patients died of overwhelming sepsis, 1 of pulmonary embolus, and 1 following a cerebrovascular accident. Surgical intervention is the treatment of choice. Cholecystectomy should be carried out whenever possible, but sometimes only simple cholecystostomy can be performed. Interim nonoperative treatment by means of polyvalent gas-bacilli antisera, antibiotics and regulation of fluid and electrolyte balance is necessary.

HEMODYNAMIC AND ANGIOCARDIOGRAPHIC OBSERVATIONS IN AN ADULT WITH PERSISTENT LEFT SUPERIOR VENA CAVA DRAINING INTO THE CORONARY SINUS AND INTERATRIAL SEPTAL DEFECT.

Johnson, J. B.; Lawlah, J. W., and Hedgepath, L. E. *Am. Heart J.* **49:** 777 (May) 1956.

A 50-year-old woman was shown by cardiac catheterization and angiocardiography to have an interatrial septic defect and, in addition, a persistent left superior vena cava draining into the coronary sinus. This is thought to be the first reported instance of the diagnosis of this combination of anomalies in a living adult subject. The embryologic basis of anomalies of the superior vena cava is reviewed. The types of persistent left superior vena cava are tabulated. Because of increasing cardiomegaly, it is believed that this patient is approaching a crucial stage when congestive heart failure is likely to occur. She has been shown to have a large left-to-right shunt but apparently little pulmonary arteriolar sclerosis, as judged by normal pulmonary resistance. Although definitive cri-

teria for surgical therapy of interatrial septal defects in adults are not established, surgery is recommended in this patient because of impending heart failure.

CONCURRENCE OF MACULAR EDEMA WITH CATARACT EXTRACTION.

Nicholls, J. V. V. *A. M. A. Arch. Ophthalmol.* **55:** 595 (May) 1956.

Nine instances of macular edema occurring in 8 patients in association with cataract extraction are reported. Macular edema probably occurs frequently after cataract extraction, but few references to it appear in the literature. In 4 instances, the edema appeared at the time of cataract extraction, and in 5 some time after the operation. It was associated with prolapse of the vitreous forward in 4 patients. The causes of macular edema in these instances are discussed in detail. The predisposing cause may have been vascular instability in the retina or choroid or both in the macular region brought about, in part at least, by cataract extraction. Five of the patients had hypertension. In some cases, anxiety may have been the precipitating cause, possibly inducing vasospasm. In others, prolapse of the vitreous through the pupil played a part. The recovery was good in all except 1 patient. No vasodilators were used in 4 of the patients but, because of the results with their use in macular edema not associated with cataract extraction, they may be worthy of a trial.

POSTMENOPAUSAL ENDOMETRIAL HYPERPLASIA.

Novak, E. R. *Am. J. Obst. & Gynec.* **71:** 1312 (June) 1956.

Thirty-six cases of postmenopausal endometrial hyperplasia, treated by hysterectomy and removal of ovarian tissue, have been studied and found to show features identical with those noted in conjunction with cases of adenocarcinoma. This seems further to substantiate the relationship between the two diseases and, since estrogen is the usual agent producing endometrial hyperplasia, additional support for its role in the development of fundal cancer is afforded. Adenocarcinoma seems an exaggerated and extreme end-stage of postmenopausal hyperplasia if there is a continued stimulus; and persistently recurring and proliferative degrees of hyperplasia do not lend themselves to conservatism. The development of endometrial cancer in ovulating women seems to represent a different disease process, and may be a sequel to patches of unripe endometrium incapable of responding to progesterone, and thereby subject to prolonged unopposed estrogens. The variety of metabolic and pluriglandular aspects of postmenopausal hyperplasia and adenocarcinoma strongly suggests a possible important role of the pituitary gland. (Author's conclusions)

A PSYCHIATRIC STUDY OF ATTEMPTED SUICIDE IN PERSONS OVER SIXTY YEARS OF AGE.

O'Neal, P.; Robins, E., and Schmidt, E. H. *A. M. A. Arch. Neurol. & Psychiat.* **75:** 275 (March) 1956.

Nineteen persons aged 60 years and over were interviewed and examined immediately following a suicide attempt. The age range was from 61 to 84 years. Every patient suffered from a definite psychiatric disease. These fell into four categories: chronic brain syndrome, 5; manic depressive depression, 9; acute confusional state, 3; and chronic alcoholism, 2. Eighty-nine per cent of the patients were psychotic, in contrast to a younger group of patients among whom only 23 per cent were psychotic. Also among younger persons attempting suicide, there was a wider variety of psychiatric reaction types. Many of the older patients had a history of psychiatric illness. Although 9 of the 19 patients had definite physical illness in addition to their psychiatric illness, their reaction to it did not appear to be an important immediate factor in their suicide attempts; neither were loneliness and social isolation important factors leading to attempted suicide. Potentially

disturbing life situations were much more frequent among the younger group of patients. A high proportion of the elderly patients (63 per cent) made genuine attempts at suicide. Two succeeded in killing themselves within a year following the attempts reported. Two important points in the management of these patients are 1) that they have a clinically evident illness that can be diagnosed by a physician without special training in psychiatry, and 2) once diagnosis is made, a well defined management procedure is available. Most of the patients reported suffered from a treatable (psychotic depression) or reversible (acute brain syndrome) disease. Immediate management consists of hospitalization in order to treat the underlying illness and to prevent suicide. By so doing, many of these patients can be returned to society as useful citizens.

POSTPHLEBITIC SYNDROME. MAJOR VEIN LIGATION AND/OR LUMBAR SYMPATHECTOMY.

Palumbo, L. T.; Monnig, P. J., and Vespa, R. *Am. J. Surg.* **91:** 890 (June) 1956.

In 18 men of average age 50.2 years with postphlebitic syndrome, a major vein was ligated and lumbar sympathectomy performed. Only the latter procedure was performed in 22 men of average age 44.2 years, also with postphlebitic syndrome. The condition in 7 patients followed surgery. In the remaining patients it was due to recurrent acute thrombophlebitis and secondary to immobilization due to medical diseases or conditions. The average duration of symptoms in the two groups was 8.2 and 6.3 years, respectively. Two thirds of the patients in each group had been treated with conservative measures prior to the therapy described. The indications for these procedures were limited to persons with recurrent pulmonary infarctions alone or with recurrent propagating thrombosis associated with increasing disablement. The more complicated cases were treated by the combined surgical procedure. The average follow-up was thirty-six and thirty-four months in the two groups, respectively. Certain benefits were apparent in both series. The results with vena caval ligation and lumbar sympathectomy were better than those with other types of major vein ligation. This procedure prevented further recurrent phlebitis and ascending thrombosis, and eliminated infarctions. In a fairly high percentage of the cases there was improvement in circulation (with a resultant warmer and drier extremity) as well as lowered incidence of cellulitis and associated local infections. In 25 per cent of the patients so treated, there was a reduction of edema of the extremity. The ligation of a major vein did not result in further disablement, and in many patients the degree of disability was lessened. Vena caval ligation and sympathectomy in combination appears to be the operation of choice in patients with the indications present in these series.

THE CLINICAL AND ELECTROCARDIOGRAPHIC DIFFERENTIATION OF SUPRAVENTRICULAR AND VENTRICULAR TACHYCARDIAS WITH REGULAR RHYTHM.

Schrire, V., and Vogelpoel, L. *Am. Heart J.* **49:** 162 (Feb.) 1956.

The differentiation of supraventricular from ventricular tachycardia can usually be made by careful bedside auscultation, if particular care is paid to splitting of the heart sounds. In the case of rapid regular tachycardia, 1) if the first and second sounds are single or normally split, the diagnosis of supraventricular tachycardia can be made with confidence and ventricular tachycardia excluded; 2) if there is wide splitting of both sounds, ventricular tachycardia is usually present; 3) if there is wide splitting of both sounds, variation in the intensity of the first sound and independent, irregular "Cannon A" waves in the jugular venous pulse, the diagnosis of ventricular tachycardia can usually be made with confidence. The wide splitting of both heart sounds is a manifestation of ventricular asynchrony. The variation in the intensity of the first sound and the independent, irregular "Cannon A" waves is a reflection of auriculoventricular dissociation. Supraventricular tachycardia with bundle-branch block, ventricular tachycardia with auricular fibrilla-

tion, and ventricular tachycardia with retrograde conduction are all rare conditions in which ventricular asynchrony occurs without auriculoventricular dissociation. Wide splitting of both heart sounds without variation in the intensity of the first sound is therefore observed. Differentiation is difficult, but can be made by careful study. In the case of rapid regular tachycardia, 1) if the electrocardiogram reveals a QRS interval of normal duration, the diagnosis of supraventricular tachycardia is established; auricular activity can usually be demonstrated by standard electrocardiograms and esophageal leads are rarely necessary; 2) if the electrocardiogram reveals a widened QRS, supraventricular tachycardia with bundle-branch block cannot be differentiated from ventricular tachycardia, unless auricular activity is demonstrated. Whereas clinical evidence of auricular activity can be readily detected, the diagnosis cannot usually be made by the conventional electrocardiogram, as the P waves are often obscured by the widened QRS-T complexes. The esophageal leads, however, will clearly demonstrate P waves and thus overcome this problem. The esophageal lead is essential in the differentiation of supraventricular tachycardia with bundle-branch block, ventricular tachycardia with independent auricular activity, ventricular tachycardia with retrograde conduction, and ventricular tachycardia with auricular fibrillation. The same clinical features that help to differentiate supraventricular tachycardia from ventricular tachycardia help to differentiate auricular from ventricular premature systoles. (From authors' summary)

SOME PHYSIOLOGIC ASPECTS OF AGING IN MAN.

Shock, N. W. *Bull. New York Acad. Med.* **32:** 268 (Apr.) 1956.

The author's approach to the problem of aging has been to describe quantitatively changes in physiologic functions in persons free from symptomatology of a disease state that would influence an organ system under study. Aging being regarded as a process, individuals distributed over the entire life span have been included in his studies. Not all physiologic processes decline with age. Some that do are mentioned with citations from the literature, as follows: the acid-base equilibrium of the blood, the fasting arterial blood sugar level, blood volume, absorption of vitamin A, eosinophil response to intramuscular administration of ACTH, and ability to retain nitrogen. When several regulatory systems are involved, equilibrium may be maintained in elderly persons as well as in those who are younger. Under physiologic stress, the older person usually shows a greater physiologic response and slower return to basal or resting levels. Among physiologic functions that show differences with age are: a diminution in renal plasma flow with increasing age; reduction of about 6 per cent per decade in glomerular filtration rate, in maximum rate of excretion of Diodrast, and in the maximum rate of reabsorption of glucose; progressive loss in ability of the renal tubular cell to perform osmotic work; a significant diminution in resting cardiac output; and gradual fall in basal heat production. On the basis of the evidence presented, it is concluded that in those physiologic functions that show a diminution with age the changes are gradual and extend over the life span without evidence for sudden changes at a given chronologic age. There are wide individual differences in the physiologic changes that take place with age. Therefore, other factors than aging play a large role in influencing the decrements in an individual. The possible explanations for these changes are discussed. Part of the diminution in physiologic function of various organ systems can be ascribed to a loss of functioning tissue, but some functions undergo changes that cannot be accounted for in this way. In future research into the problems of aging, the need is to identify quantitative alterations in a specific organ-system performance and to study integrated performance in order to determine how organ systems work together to meet bodily stresses.

NUTRITIONAL PROBLEMS OF ADVANCING AGE.

Stare, F. J. *Bull. New York Acad. Med.* **32:** 284 (Apr.) 1956.

Experiments with the use of non-caloric sweeteners and artificially sweetened foods show them only occasionally to have value in weight-reducing programs. Preventive mea-

sures in weight control are emphasized. The findings of studies on serum cholesterol and lipoprotein levels under various circumstances are cited. Advice as to the diet of the elderly person is summarized: His food needs do not differ from those of younger persons. A variety of nutritious foods each day still is important to him. His digestive system has slowed somewhat. Small meals may prove more comfortable and satisfying. In contrast to diet in younger persons, the elderly person requires 1) fewer calories and, because of this reduced requirement, activity somewhat above the maintenance level, 2) a smaller proportion of calories contributed by fat and a larger proportion by protein, 3) dietary modifications as necessitated by poor dentures, low income, inadequate cooking facilities and poor appetite, and 4) attention to the prevention of, and protection against disability, disease, deficiency and distress, and the preservation and improvement of health. The application of these principles prior to advancing age will make that period healthier and happier.

THE SERUM PROTEIN-BOUND IODINE DURING TREATMENT OF THYROID DISORDERS.
Wahlberg, P.; Lamberg, B.-A., and Forsius, P. I. *Acta med. scandinav.* **154:** 257 (May 26) 1956.

The serum protein-bound iodine (SPI) level was studied in 54 patients with thyrotoxicosis treated surgically, 31 patients with thyrotoxicosis treated with antithyroid drugs, 11 patients with nontoxic nodular goiter treated surgically, and 14 patients with hypothyroidism treated with thyroid. The SPI determination offers valuable aid in evaluating the postoperative course in thyrotoxicosis. The SPI values show a tendency to fall after surgical intervention, and fall to very low levels within about two months following operation in cases in which hypothyroidism later develops. Following the SPI values offers a clue to correct dosage in the conservative treatment of thyrotoxicosis. Thus when the clinical result is good, the SPI level declines gradually. When the SPI level displays considerable variation, there is usually unsatisfactory control of the condition. When iodide is given simultaneously with antithyroid drugs, the SPI values tend to rise. This rise may not be dependent on the inorganic iodine, but may be an expression of the fact that the iodide dosage is too high compared with the antithyroid dosage. There has sometimes been a rise in the SPI level in cases of recurrence of the thyrotoxic state after conservative management. This phenomenon lacks an explanation. The SPI level frequently rises after operation in patients with nontoxic nodular goiter. This may be related to the character of the goiter which is endemic in Finland, in which thyroid function is not necessarily impaired by operative intervention. In the treatment of hypothyroidism, the SPI concentration can be used as an indicator of the blood thyroid hormone content. The clinical state is, however, the best criterion in such treatment. The SPI level can be useful in cases of suspected over- or under-dosage.

THE NATURE OF THE RESPONSE TO STRESS WITH AGING.
Whittenberger, J. L. *Bull. New York Acad. Med.* **32:** 329 (May) 1956.

The complexities of reaction to stress are emphasized. Evidence that the response to stress varies and is impaired with age is discussed with special reference to muscular exercise, physiologic functions, homeostatic mechanisms, maintenance of function, time relationships in adaptation, rate of convalescence, endocrine mechanisms, and increased susceptibility to the forces of mortality. In summary, the author states that the impairment of reaction to stress with age is real. The results are not necessarily serious, as long as internal and external stresses are reduced in proportion to diminished adaptive capacities of the aged. Compensatory mechanisms and experience minimize the results of physiologic limitations, but more and more of these factors are called into play as the organism ages. Much could be accomplished in preservation of function of the elderly, if attention were paid to maintenance of high levels of mental and physical activity. The organism will eventually "run down" as physiologic reserves are exhausted, but meanwhile everything possible will have been done to make life not only longer but more satisfying.

BOOKS RECEIVED

Receipt of the following books for review is hereby acknowledged. We are glad to publish complete listings of all new books received but such listing must be regarded as a sufficient return for the courtesy of the sender. Books of particular interest will be reviewed in full as time and space permit. Additional information in regard to all listed books will be gladly furnished upon request.

MANAGEMENT OF STROKES. By *Keith W. Sheldon, M.D.* Cloth. $3.00. Pp. 134. J. B. Lippincott Company, Philadelphia, 1956.

DIABETES MELLITUS. By *Howard F. Root, M.D.*, Medical Director of the Joslin Clinic, Boston, Lecturer in Medicine, Harvard Medical School, Boston, Vice-President International Diabetes Federation, formerly President of the American Diabetes Association, Physician New England Deaconess Hospital and Boston Lying-In Hospital, and *Priscilla White, M.D.*, Joslin Clinic, Boston, Instructor in Pediatrics, Tufts University, Boston, Physician New England Deaconess Hospital and Boston Lying-In Hospital. Cloth. $7.00. Pp. 346. McGraw-Hill Book Company, Inc., New York, 1956.

AGING: A CURRENT APPRAISAL. The Southern Conference on Gerontology. Volume 6, Institute of Gerontology Series. Edited by *Irving L. Webber, Ph.D.* Paper. $2.50. Pp. 179. University of Florida Press, Gainesville, 1956.

OBSERVATIONS ON KREBIOZEN IN THE MANAGEMENT OF CANCER. By *A. C. Ivy, Ph.D., M.D.*, Distinguished Professor of Physiology and Head of the Department of Clinical Science, University of Illinois, and formerly Executive Director of the National Advisory Cancer Council and Director-at-large of the American Cancer Society, *John F. Pick, M.D.*, Head of Department of Plastic Surgery, Columbus Hospital, Chicago, and formerly Assistant Clinical Professor of Surgery, University of Illinois, and *W. F. P. Phillips, M.D.*, Department of General Practice, St. Francis Hospital, Evanston, Illinois. Cloth. $2.50. Pp. 88. Henry Regnery Company, Chicago, 1956.

ESSENTIAL UROLOGY. By *Fletcher H. Colby, M.D.*, Consultant, Massachusetts General Hospital, Urological Consultant, Lakeville State Sanatorium, Middleboro, Massachusetts, and Lemuel Shattuck Hospital, Boston, Massachusetts. Former Chief of the Urological Service, Massachusetts General Hospital, and Associate Clinical Professor of Genito-Urinary Surgery, Harvard Medical School. Cloth. $8.00. Pp. 656. The Williams & Wilkins Company, Baltimore, 1956.

MENTAL HEALTH PLANNING FOR SOCIAL ACTION. By *George S. Stevenson, M.D.*, National and International Consultant, The National Association for Mental Health, Inc., Consultant, U. S. Public Health Service, Department of Health, Education and Welfare, National Institute of Mental Health, and Veterans Administration. Cloth. $6.50. Pp. 358. McGraw-Hill Book Company, Inc., New York, 1956.

THE NEUROSURGICAL ALLEVIATION OF PARKINSONISM. By *Irving S. Cooper, M.D.*, Director, Department of Neurosurgery, St. Barnabas Hospital, Assistant Professor of Neurologic Surgery, New York University, Bellevue

Medical Center, Associate Attending Neurosurgeon, Bellevue Hospital, Associate Attending Neurosurgeon, University Hospital, New York. Cloth. $8.50. Pp. 104. Charles C Thomas, Publisher, Springfield, Illinois, 1956.

VIRUS DISEASES AND THE CARDIOVASCULAR SYSTEM. By *Ernest Lyon, M.D.* Cloth. $5.75. Pp. 215. Grune & Stratton, Inc., New York, 1956.

HOW TO LIVE 365 DAYS A YEAR. By *John A. Schindler, M.D.*, Chairman, Department of Medicine, The Monroe Clinic, Monroe, Wisconsin. Cloth. $4.95. Pp. 222. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1956.

THE GOLDEN YEARS. AN INVITATION TO RETIREMENT. By *Thomas Collins.* Cloth. $3.75. Pp. 251. The John Day Company, New York, 1956.

FIVE HUNDRED OVER SIXTY. A Community Survey on Aging. By *Bernard Kutner*, Albert Einstein College of Medicine, Yeshiva University, *David Fanshel*, Family and Children's Service, Pittsburgh, *Alice M. Togo*, Cornell University Medical College, and *Thomas S. Langner*, Cornell University Medical College. Cloth. $4.00. Pp. 345. Russell Sage Foundation, New York, 1956.

PULMONARY EMPHYSEMA. Edited by *Alvan L. Barach, M.D.*, Clinical Professor of Medicine, Columbia University, College of Physicians and Surgeons, and *Hylan A. Bickerman, M.D.*, Assistant Clinical Professor of Medicine, Columbia University, College of Physicians and Surgeons, New York. Cloth. $10.00. Pp. 545. The Williams & Wilkins Company, Baltimore, 1956.

PERSONAL HEALTH RECORD. By *Carl A. Dragstedt, M.D., Ph.D.*, Northwestern University Medical School, Chicago. Paper. $1.00. Pp. 64. The Military Service Publishing Company, Harrisburg, Pennsylvania, 1956.

HUMAN PROBLEMS OF A STATE MENTAL HOSPITAL. *Ivan Balknap, Ph.D.*, Associate Professor of Sociology, University of Texas. Cloth. $5.50. Pp. 277. McGraw-Hill Book Company, Inc., New York, 1956.

MENTAL DISORDERS IN LATER LIFE. Edited by *Oscar J. Kaplan.* Cloth. $7.50. Pp. 508. Stanford University Press, Stanford, California, 1956.

DIAGNOSIS AND TREATMENT OF VASCULAR DISORDERS (ANGIOLOGY). Edited by *Saul S. Samuels, M.D.*, Editor-in-Chief, *Angiology*, President, Angiology Research Foundation, Director Angiology and Attending Vascular Surgeon, Brooklyn Hebrew Home and Hospital for the Aged. Cloth. $16.00. Pp. 621. The Williams & Wilkins Company, Baltimore, 1956.

YOUR BLOOD PRESSURE AND HOW TO LIVE WITH IT. By *William A. Brams, M.D.* Cloth. $2.95. Pp. 160. J. B. Lippincott Company, Philadelphia, 1956.

UROLOGY. By *B. G. Clarke, M.D.*, Associate Professor of Urology, Tufts University School of Medicine, Urologist, New England Center Hospital, Urologist-in-Chief, Boston Dispensary, Consultant in Urology, Boston Floating Hospital, and *Louis R. M. Del Guercio, M.D.*, Assistant Resident Surgeon, St. Vincent's Hospital, New York. Cloth. $6.50. Pp. 245. McGraw-Hill Book Company, Inc., New York, 1956.

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